

Performance determinants for emerging agricultural cooperatives in South Africa

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Abstract

South Africa has seen an increase in the number of cooperatives (co-ops) registered since 2005, following the new policy aimed at the promotion of cooperative enterprises. Newly registered co-ops received over R5.28 billion in direct financial support, comprising a combination of grants and loans from government. Over and above the financial support, co-ops also receive non-financial support in the form of capacity development. Some of the co-ops received support in the form of inputs and farming equipment. In spite of the support that government provides to emerging co-ops, the majority remain vulnerable and weak. This study seeks to establish the factors that determine the performance of emerging agricultural cooperatives in South Africa. In order to attain this, data were obtained from the Cooperative Data Analysis System (CODAS) of the Department of Agriculture Forestry and Fisheries. Cooperatives considered for the study have been in operation for at least five years by 2017. Results of the Spearman's correlation used to analyse the results indicate that membership, wages, training and number of years in operation have a significant impact on the dependent variable, turnover. The main limitation of the study is the use of turnover alone as a measure of performance, due to limited data. Other variables such as growth in membership could be used as additional measures of performance; however, the numbers per cooperative in the study are constant throughout the observations.

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Table of Contents

Abstract	ii
Acknowledgements	iii
LIST OF TABLES	vii
LIST OF FIGURES.....	viii
GLOSSARY OF TERMS	ix
List of Acronyms.....	x
CHAPTER 1. INTRODUCTION	1
1.1 Background.....	1
1.2 Problem statement	4
1.3 Purpose and significance of the research.....	5
1.4 Research questions and scope.....	5
1.5 Research assumptions.....	6
1.6 Justification of the research	6
1.7 Organization of the study	7
CHAPTER 2. LITERATURE REVIEW	8
2.1 Introduction	8
2.2 Definition, values and principles of cooperatives	8
2.2.1 The cooperative	8
2.2.2 Cooperative Values	10
2.2.3 Cooperative principles.....	11
2.3 The nature of agricultural cooperatives	13
2.4 The importance of agricultural cooperatives in rural development.....	15
2.4.1 Contribution to food production.....	15
2.4.2 Access to markets and income generation	16
2.4.3 Improved farm incomes	16
2.4.4 Wide participation of rural communities	16
2.4.5 Employment creation and poverty reduction	18
2.5 Theory of farmer cooperatives	18
2.5.1 Neo classical theory	18
2.5.2 Imperfect competition	20
2.5.3 Transaction cost economics	21
2.5.4 Game Theory.....	22
2.6 Investment problems in traditional cooperatives.....	24

2.6.1	Horizon problem	24
2.6.2	Portfolio problem	25
2.6.3	Free-rider problem.....	26
2.7	Alternative cooperative models	27
2.8	Cooperative performance	28
2.8.1	Defining cooperative performance.....	29
2.8.2	Empirical overview for performance factors	30
CHAPTER 3. METHODOLOGY.....		33
3.1	Introduction	33
3.2	Research methodology	33
3.2.1	Quantitative approach	33
3.3	Research design	35
3.3.1	Population and population size	36
3.3.2	Sample size and population sampling techniques	36
3.3.3	Data sources	37
3.3.4	Estimation approaches and model.....	37
3.4	The variable description and measurement	43
3.4.1	The predictor variable	43
3.4.2	Explanatory variables	43
3.5	Data analysis.....	47
3.5.1	Descriptive statistical analysis	48
3.5.2	Inferential statistical analysis	49
3.6	Limitations of the study.....	55
3.7	Conclusion.....	55
CHAPTER 4. RESEARCH FINIDNGS AND ANALYSIS.....		56
4.1	Introduction	56
4.2	Descriptive statistics of variables	57
4.2.1	Characteristics of the categorical variables	57
4.3	Characteristics of the categorical variables	60
4.4	Correlation analysis	63
4.5	Regression analysis models	64
4.5.1	Hausman Test for the models.....	65
4.5.2	Diagnostic tests for the fixed effects model	66

4.5.3	The fitted fixed effects regression models	67
4.6	Independent t-tests to determine performance determinants	71
4.7	ANOVA tests to determine the determinants of performance	75
4.8	Summary and conclusions	81
CHAPTER 5. DISCUSSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH.....		82
5.1	Introduction	82
5.2	Overview of the key factors that determine performance	82
5.2.1	Membership.....	82
5.2.2	Training	83
5.2.3	Number of years in operation.....	83
5.2.4	Wages	84
5.3	Summary and conclusions	84
5.4	Policy implications and recommendations	84
5.5	Future research	85
REFERENCES.....		86
APPENDICES.....		108

LIST OF TABLES

TABLE 1: ORIGINAL ROCHDALE PRINCIPLES OF CO-OPERATIVES.....	11
TABLE 2 COOPERATIVE PRINCIPLE	12
Table 3: TRADITIONAL VS NEW GENERATION COOPERATIVES	28
TABLE 4: CHARACTERISTICS OF THE CATEGORICAL VARIABLES.....	57
TABLE 5: DESCRIPTIVE STATISTICS OF CONTINUOUS VARIABLES 2013-2017	60
TABLE 6: CORRELATION ANALYSIS OF TURNOVER WITH THE EXPLANATORY VARIABLES	63
TABLE 7: HAUSMAN TEST FOR THE MODELS.....	65
TABLE 8: WALDS TEST FOR GROUP WISE HETEROSKEDASTICITY FOR THE MODELS	66
TABLE 9: WOOLRIDGE TEST FOR AUTOCORRELATION FOR THE MODELS.....	67
TABLE 10: REGRESSION RESULTS: LNTURNOVER DEPENDENT VARIABLE WITH ALL VARIABLES	68
TABLE 11: REGRESSION RESULTS: LNTURNOVER DEPENDENT VARIABLE WITH ALL VARIABLES EXCEPT FOR MANAGER QUALIFICATION	69
TABLE 12: REGRESSION RESULTS: LTURNOVER DEPENDENT VARIABLE WITH ALL VARIABLES EXCEPT MANAGER QUALIFICATION AND NUMBER OF YEARS IN OPERATION.....	71
TABLE 13: INDEPENDENT T-TEST TO DETERMINE IMPACT ON PERFORMANCE	72
TABLE 14: WELCH ROBUST TEST TO DETERMINE DETERMINANTS OF PERFORMANCE	76
TABLE 15: GAMES-HOWELL HOMOGENEOUS GROUPS FOR PERFORMANCE BY PROVINCE	77
TABLE 16: GAMES-HOWELL HOMOGENEOUS GROUPS FOR PERFORMANCE BY ACCESS TO LOAN	78
TABLE 17: GAMES-HOWELL HOMOGENEOUS GROUPS FOR PERFORMANCE BY ACCESS TO LAND	79

LIST OF FIGURES

FIGURE 1: INPUT-OUTPUT RELATIONSHIPS IN A PRODUCTION FUNCTION	19
FIGURE 4: STEPS IN THE QUANTITATIVE RESEARCH PROCESS (NEUMAN, 2014:18).....	34
FIGURE 5: CONFIDENCE INTERVAL ERROR BARS FOR TURNOVER BY ACCESS TO LAND.....	74
FIGURE 6: CONFIDENCE INTERVAL ERROR BARS FOR PERFORMANCE BY MANAGER QUALIFICATION	75
FIGURE 7: CONFIDENCE INTERVAL ERROR BARS FOR TURNOVER BY PROVINCE	77
FIGURE 8: CONFIDENCE INTERVAL ERROR BARS FOR TURNOVER BY ACCESS TO LOAN.....	79
FIGURE 9: CONFIDENCE INTERVAL ERROR BARS FOR TURNOVER BY ACCESS TO LAND.....	80

GLOSSARY OF TERMS

AgriBEE Sector Code The Transformation Code for the agricultural sector

List of Acronyms

ANC	African National Congress
CIPC	Companies and Intellectual Property Commission
CODAS	Cooperative Data Analysis System
Co-op(s)	Cooperative(s)
COPAC	Cooperative and Policy Alternative Centre
DAFF	Department of Agriculture Forestry and Fisheries
DoA	Department of Agriculture
dti	Department of Trade and Industry
FAO	Food and Agriculture Organization
IFAD	International Fund for Agricultural Development
FCA	Federal Cooperative Agency
ILO	International Labour Organization
IOF	Investor Owned Firm
Land Bank	Land and Agricultural Bank of South Africa
NDP	National Development Plan
NPC	National Planning Commission
SAHO	South African History on Line
SMME	Small Medium and Micro Enterprises
StatsSA	Statistics South Africa
USDA	United States Department of Agriculture

CHAPTER 1. INTRODUCTION

1.1 Background

Agriculture is one of the main primary activities in the rural areas of South Africa where unemployment, poverty and inequality are highest, compared to urban areas (Von Fintel & Pienaar, 2016). The National Planning Commission¹ (NPC) acknowledges the critical importance of the agricultural sector, through its inherent ability to absorb excess unskilled labour and by providing economic opportunities to the rural poor. The agriculture sector in South Africa is widely recognised for its dual nature, comprising a well-integrated and highly capitalised large-scale commercial sector (Pienaar & Traub, 2015). There is also a less developed and resource-constrained smallholder sector comprising mainly black producers. Smallholder producers are poor and less educated, and mainly concentrated in the rural parts of the country (Thamaga-Chitja & Morojele, 2014). To a considerable extent, they were deliberately overlooked by policy makers and excluded from substantial incentives received by their commercial counterparts. Evidence of lack of support of smallholder producers remains, as unveiled by the underdeveloped infrastructure, poor access to finance, information and established commercial markets, all which hinder their business prospects.

Success enjoyed by the commercial farming sector in South Africa, according to Greyling, Vink and Mabaya (2013), dates as far back as the 1950s and 1960, when the government committed large resources to create white farming communities. At the height of financial and economic sanctions imposed by the international community in protest to South Africa's segregation policies, the country adopted inward-looking policies based on protectionism and import replacement (Gossel & Biekpe, 2013). Government support to the commercial farming sector intensified and farmers enjoyed direct price support in the form of: (a) tariffs, which by nature aim to insulate local industries from foreign competition through taxes levied on foreign goods to make imports more expensive compared to similar local products; (b) subsidies extended to producers for inputs and products, equally had a price-distorting impact and provided farmers with artificial competitive edge on price. In addition to various direct price support mechanisms, government also provided support in the form of infrastructure, tax concessions, drought relief, research and development as well as extension services (Ortmann & King, 2007).

¹ Commission set up by government of South Africa tasked with responsibility to draft a national road map for the stimulation of the economy through intensive support of identified high growth sectors.

Development of the commercial farming sector was strengthened by legislation, such as: (a) the Native Land Act of 1913 (Act no. 27 of 1913) and Native Trust Land of 1936 (Act no. 18 of 1936) which dispossessed black people of land and resettled them in the reserves of the country, while the rest of the land was reserved for the white population; (b) the Land Bank Act of 1920 (Act no. 18 of 1920) and Land Bank Act of 1942 (Act no. 13 of 1942) established the Land and Agricultural Bank, whose main aim was to offer commercial farmers and cooperatives loans at concessionary rates; (c) Cooperatives Societies Act of 1922 (Act no.28 of 1922) and Cooperatives Societies Act of 1939 (Act no. 29 of 1939) made it possible for farmers to secure input supply and market their products; (d) the Marketing Act of 1937 (Act no. 26 of 1937) and the Marketing Act of 1968 (Act no. 59 of 1968) established various marketing schemes under which almost a third of agricultural products were marketed, as well as control boards who administered the schemes (World Bank, 1990). Producers were obliged to market their products through the schemes at fixed prices. The Surplus Removal Scheme, for example, guaranteed prices for certain commodities. Under the scheme, when prices of a commodity in question dropped below a certain minimum level, government intervened to compensate farmers (Ortmann & King, 2007; SAHO, 2017; dti, 2012; World Bank, 1994).

Cooperatives (co-ops) in particular served as crucial conduits in driving government policy for the successful development of white farming communities (Ortmann & King, 2007). Co-ops drove government strategy of food self-sufficiency and maintaining income levels of white commercial farmers. Agricultural co-ops were specifically chosen as recipients of substantial support from government. According to the dti (2012), the co-ops turned into successful business ventures that transformed the farming sector as envisaged by government. They supported farmers by providing crucial services such as access to finance, supply of farming inputs, transportation, marketing and processing.

During the mid- to late 1990s, following the introduction of democratic rule, South Africa re-entered the international economy. In a comparable manner to other African countries removing barriers to promote free trade nationally and internationally in the face of liberalization during the 1980s and 1990, the South African agricultural sector underwent major structural reforms which included deregulation of the marketing of agricultural products boards, abolition of related tax concessions to farmers, land reform and trade policy reforms (OECD, 2015).

The effects of segregation policies under apartheid remain marked and are characteristic of the South African economy. The economy is characterized by high levels of unemployment,

accompanied by endemic household poverty and inequality. During the first quarter of 2016, the unemployment rate was recorded at 26.7 percent of the total population (Stats SA, 2016). Unemployment is structural, mainly a result of policies through which the majority of the black population was deliberately excluded from participating in the mainstream economy. The quality of education received was of such a poor standard that even the jobs created, especially by the private sector, did not usually find the matching skills. To exacerbate the problem, government in its plans did not take into consideration the abundance of low-skilled people in the country. Instead, it invested in capital-intensive import substitution growth strategies in an effort to industrialize the economy (World Bank, 1994). The World Bank (WB) further indicated that labour-intensive sectors such as agriculture became highly mechanized, ensuring that the majority of unskilled workers did not have any prospects of ever finding employment. The country missed an opportunity to capitalize on labour-intensive industries where its comparative advantage lies.

The interests of the new democratic government lie in increasing the number of competitive emerging agricultural enterprises that participate in the mainstream economy and create employment, while reducing poverty and inequality. The creation of an environment where smallholder producers thrive alongside big commercial farmers is important to government. The smallholder producers are tasked with improving the livelihoods of at least 370 000 people living in rural areas (National Planning Commission, 2011). Co-ops are recognized as a viable option to effectively mobilize farmers to form groups and pool resources to become more effective in agricultural production (Yamusa & Adefila, 2014). It is cheaper and easier to provide farmers with modern farm technologies when they are organized into co-ops (Tadesse, 2002, cited in Nugusse, Van Huylenbroeck and Buysse, 2013).

Support for emerging cooperative enterprises emanates from the highest level in government and has been consistent throughout the years. At the Presidential Growth and Development Summit held in July 2003, the then President, Thabo Mbeki, used the platform to affirm the role of cooperative enterprises in rural development and eradicating poverty. Former President Zuma specifically elevated this role in his Nine Point Plan in the State of the Nation Address (SONA) in 2015. The motivation behind supporting emerging agricultural co-ops is commitment by government to improve the rural livelihoods through commercialization of smallholder producers.

The government strategy now leans more towards support of smallholder producers, to mobilize them into cooperative enterprises. A new cooperative policy aimed at the promotion of cooperative enterprises was developed in 2004. Subsequently, a new Cooperatives Societies Act (Act no. 14 of 2005), based on international principles and values of cooperatives, was enacted in 2005, replacing the Cooperatives Societies Act (Act no. 96 of 1981), which government regarded as unsuitable to support emerging co-ops. The Act leaned more towards support of large-scale commercial agricultural co-ops (DTI, 2009). Both the new policy and Act place preference on the support and promotion of emerging co-ops. Furthermore, the mandate for the development and promotion of co-ops was moved from the Department of Agriculture (DoA), now known as the Department of Agriculture, Forestry and Fisheries (DAFF) to the Department of Trade and Industry (dti) to ensure that cooperatives in all economic and other sectors of the economy were recognized and allowed to flourish (dti, 2012). Thus far, government provides cooperatives with policy support as well as financial and non-financial support in the form of grant funding and skills development.

1.2 Problem statement

The records of the Companies and Intellectual Property Commission (CIPC) show a dramatic increase in the number of co-ops registered between 1995 through to 2012. The number of registered co-ops increased from the 1 444 registered in 17 years between 1922 and 1994 to 3 362 in nine years between 1995 and 2004 and 12 188 between 2005 and 2007 (dti, 2012). By 2012, an estimated total of 16 694 had been registered by the CPIC, with agricultural co-ops comprising the bulk of those registered between 2006 and 2015. Post 1995, newly registered co-ops received over R5.28 billion in direct financial support, consisting of a combination of grants and loans from government (dti, 2009). Financial support provided covered 90 percent of start-up costs, not exceeding R300 000 per co-op. Other schemes following more stringent criteria for funding requirements above R300 000 are available. Over and above the financial support, co-ops also receive non-financial support in the form of capacity development. Some of the co-ops received support in the form of inputs and farming equipment which includes tractors.

In spite of the support that government provides to emerging co-ops, the sector in South Africa is not as vibrant as in countries such as Kenya and Ethiopia. The majority of emerging co-ops remain vulnerable and weak, resulting in them being unable to meet the objective of serving as agents of development, especially in rural areas (Thaba & Mbohwa, 2015). The dti (2012) alludes to 11 and 89 percent survival and mortality rates respectively, among co-ops in the food

and agriculture sectors. A variety of factors, such as poor management, poor access to finance and lack of technical skills attributes to their weakness and vulnerability. The heightened sense of individualism among people has also been blamed for the poor performance of emerging co-ops (dti, 2012). The co-ops have also failed to create employment opportunities as envisaged. This failure to meet the objectives of the members works against government strategy of uplifting the living standards and eradicating extreme poverty in rural areas. People are already taking to the streets in violent protests to express frustration at government for what is regarded as a slow pace of economic inclusion as well as poor service delivery.

Mulaudzi (2017) alludes to the success of traditional community-based savings groups (*stokvels*) in the country and indicates that the *stokvels* comprise over 820 000 groups, with a combined membership of 11.4 million, out of South Africa's population of 52 million. It is also stated that the groups have control of over R44 billion per annum in member savings. This points to the different levels of performance experienced by the co-ops in the country.

1.3 Purpose and significance of the research

This study seeks to establish the factors that determine performance of emerging agricultural cooperatives in South Africa. Scholars such as Machete (1990) previously identified factors that contribute to the high failure rate among emerging agricultural co-ops. In this study, only those factors deemed to contribute to performance of emerging agricultural co-ops will be confirmed. The results of the study will inform the development of policy and strategy aimed at institutionalization of smallholder producers into agricultural cooperatives. Furthermore, the results will contribute to the strengthening of private-public partnerships in the implementation of the AgriBEE Sector Code through agricultural co-ops, more especially the enterprise and supplier development elements of the Code. Finally, the study will provide a better understanding of emerging agricultural co-ops to ensure sustainable partnerships with the private sector participants in efforts to transform the agricultural sector. Empowerment of smallholder producers through co-ops has the potential to change existing patterns of rural poverty as envisaged by the NPC.

1.4 Research questions and scope

The research seeks to investigate and answer the following question:

- What are the factors that determine performance of emerging agricultural cooperatives in South Africa? This will be determined through answering the following questions:

- What role do government support factors play in the performance of emerging agricultural cooperatives?
- What is the impact of cooperative structure factors (size of membership, membership fee, wages, the number of years in operation and training) on performance of emerging agricultural co-ops?
- How access to loans impact on success of emerging agricultural co-ops?

1.5 Research assumptions

This study makes the assumption that the sample obtained from the DAFF database on emerging agricultural co-ops is representative of the entire population of emerging co-ops in the country of study. As a result, conclusions are generic of the entire population.

1.6 Justification of the research

The population in rural areas is scattered over a vast area as opposed to the population in urban areas. As a result, the costs of servicing the rural populations tend to be much higher and require intensive management efforts (Mellor, 2009). Agriculture is the main economic activity that provides employment and income for a majority of the poor, mostly found in rural areas. However, the smallholder producers who are regarded as the major catalysts for the development and transformation of rural areas are equally scattered and unorganized, also allocated in small areas of production. The farmers face a host of challenges to make a meaningful impact to development and to function as successful businesses. Co-ops are a viable alternative that are inclusive and will cost-effectively allow government, together with its agencies to provide a supportive environment to the smallholder producers. Mobilizing smallholder producers into co-ops does not automatically provide a solution to a host of problems that smallholder producers face. However, there are many benefits to be derived from institutionalizing farmers into functional co-op structures. The benefits include reduced costs due to collective bargaining for inputs and collective marketing.

Emerging co-ops in South Africa have not been successful in allowing the farmers to benefit from a collective effort. In the context of South Africa, where a thriving agricultural sector is critical for the success of smallholders, when co-ops fail and are not able to transform and commercialize smallholder producers as anticipated, it translates into policy failure. It is therefore critical to investigate the factors that underpin performance of co-ops, especially in the absence of recent studies on the subject.

1.7 Organization of the study

The study is organized into five chapters as follows: Chapter 2 provides a review of literature on co-op enterprises and establishes the underlying theoretical aspects of co-op enterprises. Chapter 3 presents the methodology, which entails the strategy carried out in the analysis and measurement of factors that determine performance of emerging agricultural co-ops in South Africa. In Chapter 4 the results of the models are discussed. Conclusions and recommendations of the study and future research are presented in Chapter 5.

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

This chapter provides a theoretical overview of co-op enterprises, with specific reference to agricultural co-ops. The chapter is divided into six sections. In section 2.2, cooperatives' definition, values and principles are discussed; section 2.3 provides an overview of the nature of agricultural co-ops; section 2.4 discusses the importance of agricultural co-ops in rural development; section 2.5 discusses the theory of farmer co-ops; investment problems in traditional co-ops are discussed in section 2.6; while section 2.7 looks at alternative co-op models and section 2.8 is devoted to co-op performance.

2.2 Definition, values and principles of cooperatives

2.2.1 The cooperative

The International Cooperative Alliance (ICA) is a leading independent non-governmental organization set up to promote relations among all types of cooperatives throughout the world. The alliance has been in existence since 1895, with affiliations from co-ops in more than 105 countries around the world (ICA, 2017). From time to time, the organization convenes meetings and conferences with members to provide a platform for discussions and exchange of information such as statistics, news and research reports. In adopting its statement of identity, the Alliance defines a cooperative as “an autonomous association of persons, united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned democratic enterprise” (ICA, 2009).

The definition by the ICA is widely used in literature. However, some sources define cooperatives differently. Hind (1999:31) defines a cooperative as an “institution which is formed to provide benefits to its members through a wide range of services provided, contrary to other investor-owned firms that were developed to benefit the shareholders and investors through dividends and stock appreciation”. In defining a cooperative, Deller, Hoyt and Sunaram-Stukel (2009) identify five distinguishing factors that serve as criteria to determine if a firm is a cooperative. These are application of the statement of principles, incorporation status, self-identification, tax filing status and governance structure. Ogunleye, Oluwafemi, Arowolo and Odegbile (2015:40) define a cooperative as a “group of people with common interest, organized to promote the social welfare of its members”. On the other hand, Kohls (2002) defines cooperative societies as a “legal, practical means by which a group of self-selected,

selfish capitalists seek to improve their individual economic positioning in a competitive society”. According to the United States Department of Agriculture a co-op is a “user-owned, user-controlled business that distributes benefits based on use.”

The common factor in defining a co-op is the fact that a group of individuals seeks to resolve a commonly identified need or problem to their benefit. The definition by Kohls (2002) departs from the principles and the nature of co-ops in that co-ops are community-oriented organizations that seek to satisfy a range of needs as defined by the membership. Maximizing profits may not be the primary motive behind the members banding together to form a co-op. It is a common occurrence to find members from diverse backgrounds and diverse sets of interests and preferences in the same co-op. The diverse membership means the interests and objectives may not always converge. Some of the members may show interest in satisfying immediate personal needs related to improving quality of life, while others may be interested in building prospects of the co-op as a sustainable economic activity (Philip, 2003). The voluntary nature of co-ops allows for diverse objectives and goals among the membership to be resolved amicably by allowing members to agree among themselves. Unsatisfied members have freedom to exit the co-op. However, failure to advance the common interests of the membership leads to the ultimate failure of co-ops.

Co-ops as autonomous organizations need support in relation to regulatory and administrative measures in order to ensure satisfactory service delivery to the members and society at large (Yamusa & Adefila, 2014). Beyond support through legislation and recognition through registration, government’s role should be limited to facilitation of co-ops by organizing training, promotional campaigns, financial audits (Wanyama, Develtere & Pollet, 2009). Ortman & King (2007) adds that government should be involved in coordination and funding of collective action activities. When co-ops expect to get something from outside forces such as government, their performance as businesses is undermined (Nourse, 1992). The DAFF encourages the establishment of cooperative enterprises as a strategy towards commercializing emerging smallholder producers. In its strategic plan for the period 2012/13 to 2016/17, the DAFF targeted the establishment of commodity-based cooperatives throughout the period 2013 to 2017. This strategic goal puts the DAFF as the key player in the establishment of co-ops in the agricultural sector as opposed to co-ops being allowed to mushroom organically at grassroots level. However, policy in the country confines the role of government to the creation of an environment conducive for development of co-ops (Satgar, 2007).

A strong interdependence between the government and co-ops is evident in Ethiopia, with most co-op union members seconded from government to bolster capacity within the co-ops. The study by Emanu (2009) finds cooperative unions to be highly dependent on government support to access services such as bank credit as well as foreign currency required to import inputs such as fertilizers and pesticides. Further support from government to cooperative unions is in the form of collateral offered for purposes of accessing funding from financial institutions. Bibby and Shaw (2005) are critical of state-led cooperatives, while Karami and Rezaei-Moghaddam (2005) recognize the critical role of government and the State in helping in the initial stages of cooperative development. Government should exercise caution and avoid exerting control and influence over the co-ops and allow them to function and operate as autonomous entities. Without interference from government or any outside forces, co-ops can build and maintain their autonomy as authentic representatives of the needs of their members. It is for this reason that the United Nations (2003) advocates for governments to support co-ops for what they do and how well they do it in the face of other business enterprises, as opposed to supporting them because they are co-ops.

2.2.2 Cooperative Values

Literature mostly defines business organizations in terms of the ownership structure (United States Department of Agriculture, 2002). The business structure reflects who owns the firms, who owns the legal right of control as well as who is entitled to residual rights. Co-ops all have three elements bestowed on the members who are the owners, entrusted with control of the enterprise and also benefit from the proceeds of the enterprise. Separation of ownership and the legal rights of control do not exist within co-ops and ownership of all three elements by the members constitutes the core value that distinguish co-ops from other forms of business organizations. Cooperative values are general norms shared by cooperators, cooperative leaders and cooperative staff. It is imperative for values to determine the co-ops' way of thinking and operation (Hoyt, 1996). The ICA portrays co-ops as organizations with core values that ensure that they stand on their own with members being equal, depending on and supporting each other in order to achieve their goals. High standards of morality and ethics are required of the membership in running co-op businesses. Ultimately, co-op values place great emphasis and expectation on compassion for those around the co-ops.

The theories of social cohesion and social capital upon which co-ops are grounded compel them to seek a balance between pursuing profit and meeting the needs and interests of members and

their communities (Chaddad & Coock, 2004). According to Rogna (2012), meeting social objectives like caring for the community can be a difficult and unsustainable task to attain, especially from a perspective of struggling emerging co-ops. Rogna further states that the task is mostly achieved by default in the normal running of the business such as road maintenance which is carried out for collection of produce from members. In contrast to Rogna (2012), the Heiveld co-op in Niewoudville, Northern Cape (South Africa), has in its constitution embedded that 30 percent of its surplus be invested in projects that benefit the community (Cooperative and Policy Alternative Center, 2008). The struggling co-ops may find incorporating social responsibility cost as burden which they cannot attain.

2.2.3 Cooperative principles

Cooperative principles serve as guidelines against which cooperatives establish their identity and put their values into practice (ICA, 2015). The principles position co-ops as business enterprises, different from others in the way they go about conducting themselves. The original cooperative principles were established by the Rochdale Society of Equitable Pioneers². The Rochdale Society was among the early successful cooperative enterprises in history, made up of a group of 28 weavers who set up their own store. The basis for establishing this co-op was to create a means through which the members faced with economic hardships could improve their living conditions (Zeuli & Cropp, 2004; Mazzarol, Limnios & Rebound, 2011). Based on the lessons learnt from the successes and failures of earlier cooperatives, the Rochdale Society established a set of business practices, which became known as the “original” cooperative principles. These principles formed the basis on which cooperative enterprises were formed. Original Rochdale co-ops are captured in Table 1.

Table 1: Original Rochdale-principles of co-operatives

The Rochdale principles
<ul style="list-style-type: none"> • Net margins distributed according to patronage • Democratic control – one-member/one-vote • Limited return on stock

² A society created in Rochdale, England in 1883 during the first wave of consumer cooperatives

- Limitation on the number of shares owned
- Open membership
- Trading on a cash basis
- Membership education in the cooperative way of doing business
- Political and religious neutrality
- No unusual risk assumption
- Goods sold at regular retail prices, with net margins rebated to members, rather than discounted retail prices.

Source: dti (2005)

Co-op principles as originally invented by the Rochdale Society have remained, with slight modifications into a set of seven internationally recognize principles as captured in Table 2. Three of the original principles have been constant throughout and are still relevant many years later as depicted in the definition adopted by the United States Department of Agriculture (USDA), who define a co-operative as a user-owned and -controlled business from which benefits are derived and distributed equitably based on use. The three principles of: (i) user owned, (ii) user controlled and (iii) distribution of benefits among members based on patronage are regarded as the “only principles necessary in guiding co-ops”, (Zeuli & Cropp, 1980:45). Co-ops, according to Staatz (1987), have the freedom to select from among the principles without necessarily adopting them all. Both the principles and values of the co-ops are prerequisites for successful co-operation. The principles are captured in Table 2

Table 2: Cooperative principles

The ten principles
<ul style="list-style-type: none"> • Net margins distributed according to patronage • Democratic control – one-member/one-vote • Limited return on stock • Limitation on the number of shares owned • Open membership • Trading on a cash basis • Membership education in the cooperative way of doing business • Political and religious neutrality

- No unusual risk assumption
- Goods sold at regular retail prices, with net margins rebated to members, rather than discounted retail prices.

Source: the dti (2005)

2.3 The nature of agricultural cooperatives

In addition to the definition of a co-op provided previously by the ICA, this study regards an agricultural co-op as a business which is established by the farmers by jointly engaging in a common economic activity, to enable them “to maximize the benefits” from efforts of a collective (DAFF, 2015:2). With agricultural cooperatives, farmers are the owners and the main users of the services of the co-op. Joint ownership of the co-op among the producers is separate from the ownership of individual farms. The farms are treated as separate business entities from the co-op. Farmers democratically govern the co-op, with no single member being able to exert influence over other farmers or the firm as a whole (Staatz, 1989). Agricultural co-ops operate in the agricultural sector and automatically assume the inherent risks associated with the sector’s unique characteristics. The sector is influenced by uncontrollable factors such as weather patterns and volatile prices in the commodity markets. Furthermore, production of commodities is geographically specific, confined to certain areas based on climatic conditions or soils. The assets are also specific to the sector and cannot be diversified to other sectors.

Agricultural co-ops are a vehicle through which transactions between the producers, suppliers and the market can be arranged. Arrangement of transactions through co-ops becomes necessary only when it is less costly to arrange a direct exchange through the supermarket or the agro-processor (Hansmann, 2006). Theoretically, co-ops arrange transactions through integration and expansion of farm activities up- or downstream (Sexton & Iskow, 1988; Cook, Chaddad & Ilipoulos, 2004). Vertically integrated agricultural enterprises produce and own raw material required in the next stages in the production process (Sexton & Iskow, 1988). In the case of agricultural co-ops, vertical integration occurs within the co-op itself where all the activities related to transformation of the product are performed. Production takes place away from the co-op on the farms, which are separate cost centres where farmers maintain separate property rights. The purpose of forward integrating into a co-op is to eliminate the middleman.

The marketing chain for commodities in agriculture consists of multiple middlemen, each of whom claims a margin at every stage of the value chain (Daff, 2012). Middlemen, according to

Chigusiwa, Bindu, Muchabaiwa and Mudavanhu (2012), have the power to set market prices. Chigusiwa et al. (2012) further indicate that farmers engage the middlemen as buyers of last resort when marketing their produce. Cutting out middlemen along the agricultural value chain encourages direct interaction between the producers and buyers. It thus enables the producer to better understand the needs of the market first hand. When dealing with the middleman, the farmer bears a number of risks, which include the price risk. The price agreed upon between the producer and the middleman depends on performance of the market on a particular day and is therefore not guaranteed (Chigusiwa et al., 2012). To the consumer, the cost of involvement of middlemen in the marketing chain of agricultural produce comes in the form of the high price of food. Middlemen add to the price agreed with the farmer, a margin to cover costs which include the handling and marketing of the produce (Daff, 2012). As the agricultural sector modernizes and industrializes, consolidation of farms takes place to allow producers to take full control of the entire value chain from production to distribution. The middleman is eliminated in the process, thus reducing, among others, the price risk to the farmer and the ultimate price paid by the farmer for the produce.

In the modernization process, the sector moves from traditional labour-based agriculture to technology-based agriculture (Kusz, 2014:171). Agriculture is capital intensive by nature. Equipment and technologies that enable producers to integrate vertically through the agricultural value chain are specialized and specific to the sector. Capital investments in agro-processing facilities have the potential to reduce production costs and improve productivity. Furthermore, farmers can differentiate their produce and increase the possibility to bargain for higher prices. The low asset endowment which characterizes smallholder producers, together with other impairments, constrains them from accessing external capital. As a result, they are not able to meet large capital requirements associated with investments in new technologies that allows them to vertically integrate along the agricultural value chain. Investments into agro-processing facilities have minimum size requirements to meet efficiencies to operate the plant (Sexton & Iskow, 1988). These can be met through cooperation among farmers as they are able to pool resources and form a critical mass.

Categories of agricultural cooperatives depend on mainstream activities undertaken by the members. The three broad categories identified in literature include the following:

Marketing cooperatives: They are most common in the agricultural sector (Zeuli & Cropp, 2004). The farmers supply the co-op with the raw material in the form of the produce which is

processed and sold. In turn, the co-op provides a service to the farmers at cost, with profits paid back to the owners in proportion to the patronage once the co-op has deducted its costs. Processing, in some instances, involves simplified services such as washing, grading and packaging of the produce. The processed product is further sold to retailers or end consumers with a margin added to generate income that accrues to both the co-op and its owners. Emana (2009) asserts that marketing co-ops keep costs low and link different countries through export commodity trading. In accordance with Zeuli and Cropp (2004), the low costs are a result of free flow of countries such as Italy, Germany and Switzerland that have well-developed cooperative movement. Their agricultural marketing co-ops have developed their own brands as a means to differentiate their products.

Farm supply cooperatives: They distribute farm inputs such as seeds, fertilizers and farming equipment to the farmers at a low cost. When farm supplies are purchased in bulk, farmers bargain with suppliers for lower prices. In some instances, lower production costs are passed on to consumers in the form of lower prices for commodities.

Service cooperatives: They provide services such as extension, collective transportation, credit and artificial insemination to the farmers (Ortmann & King, 2007).

2.4 The importance of agricultural cooperatives in rural development

2.4.1 Contribution to food production

The role played by cooperatives in rural development is similar to the role played by agriculture in rural development (Pinto, 2009). Agriculture is the main economic activity that underpins the livelihood strategies of the rural poor, especially in sub-Saharan Africa. The smallholder producers are largely unorganized and face various internal and external constraints that deny them access to modern markets. Their contribution to global food production, however, is significant. It is estimated that 90 percent of rural households are involved in farming activities and supply up to 50 percent of the world's cereal, 60 percent of the world's meat and 75 percent of the world's dairy products (Herrero et al., 2010, cited in Kremen, Iles & Bacon, 2012). In countries such as India, the cooperative sector is the third economic sector and tasked with the responsibility to improve rural livelihoods by playing a key role in improving the agriculture sector (Kumar, Wankhede & Gena, 2015). Co-ops in India and Iran ensured consolidation of small and fragmented holdings to improve agricultural production.

2.4.2 Access to markets and income generation

The main pathway out of rural poverty for the rural poor is through improved productivity, profitability and sustainability of smallholder agriculture (Verhofstadt & Maertens, 2014). The co-ops are viable vehicles that allow participation of rural producers to jointly engage in an economic activity to access modern markets without incurring the financial burden associated with starting a business. Mohammed and Lee (2015) assert that cooperatives promote competitive participation of the rural poor in production and marketing activities through training provided. Evidence of positive incomes yielded through commercialization of smallholder producers into co-ops is seen in Ethiopia on commodities such as coffee and grain (Emana, 2009). The existence of co-ops in the coffee market in Ethiopia in accordance with Emana improved the profile of smallholder coffee producers through association with well-known international retailers, thus improving the farmers' share of the coffee price margin. Getnet and Anullo (2012) equally observe success in both the grain and dairy sectors as observed in Ethiopia, with a reduction in seasonal fluctuations in maize price and stabilization of the local grain markets in favour of co-ops.

2.4.3 Improved farm incomes

Improvements in production and productivity in agriculture have positive linkages with other non-farming sectors. The agricultural sector links with other sectors through production and expenditure. At a primary level, the linkages are up stream through the purchase of farm inputs, as well as downstream within firms that use agricultural products as raw material. Efficiency gains from production and productivity impact positively on farm revenues as well as job opportunities created on and off farms. A study by Verhofstadt and Maertens (2014) finds cooperative membership to increase farm incomes by 40 to 46 percent, compared to farms that do not cooperate. Income earned from agricultural production activities comprises 70 percent of total household income (Kremen et al., 2012). Increased incomes enable households to spend on other off-farm activities, which allow money to circulate within the rural economy and beyond, thus impacting on the welfare and economic development of society.

2.4.4 Wide participation of rural communities

Exclusion of the rural poor from mainstream economic participation can be attributed to the common incidences of poverty in rural areas. According to Bello (2005), co-ops promote full participation by a majority and also facilitate a more equitable distribution of the benefits. The

open and democratic nature of co-ops makes them key institutions that are inclusive to allow people to jointly engage in an economic activity. Adefila (2012) indicates that co-ops attract a large number of people to engage in agricultural production. This is evidenced in his study indicating that 46.6 percent of the co-op membership in Nigeria has an enrolment size ranging from 101 to 200 members. The lowest membership numbers in the study in 11 percent of the cases ranged from 51 to 100 persons. Bibby and Shaw (2005) also observe the largest individual farmer participation in the Milk Vita co-op in Bangladesh, with over 40 000 individual members from 390 primary co-ops.

Co-ops are grounded in theories of social cohesion and social capital (Yamusa & Adefila, 2014). Farmers join co-ops mainly for economic reasons such as access to markets and improved productivity, thus leading to better incomes for their produce. Co-ops therefore have to balance between the pursuit for profits and other interests of members. This balance can be attained by providing capacity-building initiatives to all those involved in the running of the co-ops, including the owners (Bello, 2005). Free information flow is key to allow co-operators to communicate on various aspects, including product and market information. Sexton and Iskow (1988) assert that the flow of information within the organization is easier than across the market. This makes co-ops the best conduit for information sharing among smallholder producers.

Information on product characteristics is more commonly shared among the co-operators than across the markets (Shaffer, 1987). Co-ops offer an environment for members to express their preferences and advice on products and services. Information shared among the co-operators involve various aspects such as the use of appropriate technology, technical advice and innovative ideas on how to increase and improve productivity on farms and yields. Appropriate technologies take various forms, which include basics such as adopting correct methods of fertilizer application and quantities. Depending on the requirements of the markets, information sharing allows members to produce according to specifications. Sissay, Verhees and Van Trijp (2017) allude to the strong social connections shared members of the cooperative by virtue of living in the same villages, which forms the basis for exchange of information and mutual communication. In the case of crops, the farmers exchange information with each other to help in decisions, which relate to the commodity to produce, when to produce, the quantities as well as where they should sell the product.

2.4.5 Employment creation and poverty reduction

Cooperatives play a significant role in creating jobs and thus alleviating poverty among the rural poor. In Kenya, approximately 82 074 jobs were created by co-ops and generated approximately half a billion Ethiopian Birr (or approximately R450 million) in wages during 2008. Emanu (2009) alludes to the 300 milk rickshaw pullers employment opportunities and other 700 jobs created for the dairy processing plants of the Milk Vita co-op in Bangladesh. Dondo (2012) also points out the 16.9 percent of the labour force that is absorbed by the co-ops in Kenya in 2008 out of a population of 37.9 million and co-op membership of 8.5 million people.

2.5 Theory of farmer cooperatives

Economists use theory as a tool to study the behaviour of economic agents (Royer, 2014). Royer further indicates that theory aims to help understand situations in which decision-makers interact. This section reviews economic theories and models that support the basis of this study, giving perspective to the existence of co-ops. Theories presented investigate agricultural markets and decision-making under prevailing market conditions as well as the rationale that supports farmers to band together into co-ops. The theories considered in this study include neo-classical theory, theory of imperfect competition, transaction cost economics (TCE) and Game Theory. Neo-classical theory analyses behaviour of a profit-maximizing firm under conditions of a perfect competitive market. The theory is the basis on which theories of imperfect competition are constructed as evidenced in Boland (1981) and Hunt and Morgan (1995). Theory of imperfect competition relates to decision-making under conditions of uncertainty, while game theory explains interaction as well as decision-making within a heterogeneous group, with specific attention to decision-making under imperfect market conditions.

2.5.1 Neo-classical theory

The neo-classical theory is based on assumptions made in relation to behaviour of economic agents and the markets. Kirsten, Karaan and Dorward (2009) describe assumptions as important scientific tools of enquiry that allow analysts to focus on a single set of issues at a time. The underlying assumption of neo-classical economic theory is economic agents comprised of firms and households involved in an exchange in a market, where there are no constraints except for scarcity of resources (Stefanovic & Mitrov, 2014). Further assumptions in accordance with the

theory dictate that it is not necessary to have rules that govern the exchange in the market, as economic agents are assumed to be rational and lack the incentive to behave in an opportunistic manner. The rewards to the participants in accordance with the theory are always in direct proportion to the extra effort employed by agents, irrespective of what is done. As a result, the theory does not anticipate conflict among the agents, given that everyone has knowledge of what the other is doing in relation to the product that is going to be produced, the quantities of the product, the price as well as the time when the product will be produced.

The firms equally engage in the exchange to obtain monetary outcomes in a form of profits or the net present value (NPV) of future profits (Doll & Orazem, 1984). Households, on the other hand, are assumed to be interested in maximizing utility or the satisfaction they derive from consumption of goods and services. In essence, the theory minimizes competition that exists among parties that participate in the market by making assumption of information that is freely available and accessible to all. In defining competition, Hornby (2010) indicates that people or organizations in competition strive to gain something that not all of them can have. Market competition, as described by Berta, Julien and Tricou (2012:7) is rivalry among producers on their own, among consumers and among producers and consumers for the exchange gains they must share. In neo-classical analysis the firm is regarded as a production function (Figure 1) wherein the factors of production such as labour, capital and inputs are automatically transformed into a product or service (Hunt & Morgan, 1995).

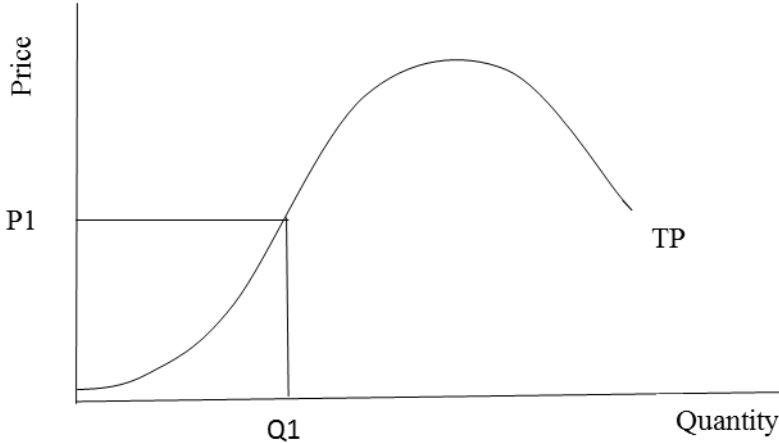


Figure 1: Input-output relationships in a production function

When firms have equal access to information, they lack the means to differentiate their products from those of other firms. The available technology is common to everyone and no firm has competitive advantage over the others. It means that the market is transparent, in such a way

that all firms have complete knowledge, nothing can happen without the knowledge of other market participants. Therefore, the product produced in this market is homogenous throughout the industry. Everyone in the industry will have the same optimum level of output, obtained at a unique point where no other combination of the variable input that results in a better yield is found (Doll & Orazem). This level of output is depicted as quantity (Q_1) and price (P_1) in Figure 1. The implication of the theory in the agricultural sector is that each producer will have full knowledge of what other producers are producing, their cost structure under different arrangements, profits as well as future intentions (Kirsten et al., 2009).

Perfect competition further assumes factors of production to be perfectly mobile. In the short term, it allows firms to move resources across to other sectors where they deem to operate. Theoretically, all the activities depicted in the graphs occur automatically in the market within the context of the production function. The agricultural sector, especially at a primary level, assumes a perfect competition model (Hill, 2006). The sector is characterized by many producers and a few large buyers. Products sold by the farmers are identical and cannot be distinguished from each other. In comparison to the total market volume, quantities delivered by each farmer are “infinitely small” (Doll & Orazem, 1984:15).

2.5.2 Imperfect competition

Agricultural markets operate under conditions of imperfect competition characterized by risk and uncertainty. Walker (1959) mentions technical and technological changes among the factors that introduce uncertainty to the decision-making and production process. There are a few large buyers consisting of wholesalers, retailers and agro-processors who procure the produce from the farmers. Some of the buyers own processing facilities and other resources such as cold chains that producers do not own. At the centre of the requirements of the buyers are quantities and consistency. The buyers further place demands of food quality and safety standards on producers. These, to a great extent serve as barriers to entry to the market, especially for resource-constrained smallholder producers who are subjected to asymmetrical and incomplete information possessed by the buyers. Asymmetric information is a result of one party (the supermarket or processor) having more information about the product than the producer (Kirsten et al., 2009).

Under the conditions discussed above, assumptions of perfect competition cease to exist, as the market fails to adhere to the ideals of providing the maximum level of output at a zero cost.

Producers thus incur costs when facilitating an exchange having to access information which is privately held and valuable to those who possess it (Bontems & Fultony, 2005). Information therefore is an asset to those in possession of it. Those in possession of information have an advantage over those without information. A lack of free and complete information, according to Kirsten et al. (2009), leads to risk and uncertainty. Customer needs and preferences for food stuff always evolved. Therefore, producers are compelled to divert some of the resources from production activities to search for information to bring associated risk and uncertainty to acceptable levels. At the same time the producers have to be empowered to be able to produce the product in line with what the market requires. Producing the product outside of market specification can lead to losses. Special institutional arrangements such as agricultural co-ops serve a means to overcome the information problem and reduce the costs of transacting.

2.5.3 Transaction cost economics

Transaction costs (TCs) are a subject of New Institutional Economics (NIE) paradigm, which supplements traditional neo-classical economics (Rindfleisch & Heide, 1997). Neo-classical economics fail to take cognisance of the role of the firm and the entrepreneur in coordinating an exchange. The theory attracted criticism from scholars such as Sykuta and Chaddad (2001) due to its failure to provide clarity on how production resources are allocated and transformed to attain profits. Furthermore, neo-classical theory recognizes the role of an entrepreneur in organizing an exchange within a firm, but fails to recognize coordination that occurs externally on the open market. The NIE theory provides insights into institutions, explaining what they are, how they arise, the purpose they serve and how they have changed over time (Klein, 1999). Coordination entails a different combination of resources, skills as well as contractual relationships inside and outside of the organization in transforming raw materials into products. In some instances, firms get into contractual arrangements to jointly operate a production process as demonstrated earlier in the study, where farmers jointly own an agro-processing facility through cooperation.

Transaction costs are costs that are incurred when one enters into exchange. They involve the sourcing of information, trading partners, negotiating, product transfer, monitoring and enforcing transactions (Randela, Alemu & Groenewald, 2008). Within the organization, interaction takes place between the employees and management on various aspects of production. Interaction also takes place in the external environment. External partners to the organization include suppliers of raw material and other partners who supply services such as

transport. To some extent, the interactions with external and internal partners lead the parties to enter into institutional arrangements such as contractual relationships as risk-mitigating mechanisms. The contracts counter opportunistic behaviour of economic agents and govern relations among contracting parties (Kherallah & Kirsten, 2002). Enforcing contracts can be a costly exercise; however, to some extent, they provide assurance that each party is willing to perform their part. High TCs deter resource constrained producers from participating in a market as well as agricultural value chains (Makhura, 2001; Verhofstadt & Maertens, 2014). The co-op allows for transaction costs to be spread over a large volume based on the number of individual members as opposed to the efforts of a single producer.

2.5.4 Game Theory

The development of Game Theory is attributed to the work of John von Neumann in a paper published in 1928 on the minimax theorem for two-person zero-sum games. A game is defined as a form of competitive activity or sport played in accordance with the rules (Soanes, 2002). Players follow a set of predetermined rules when they engage in a game in order to achieve the objectives they have set for themselves. Staats (1987) describes a game as a concept that involves decision-makers who interact in the presence of conflicting interests. The Game Theory is an abstract model of decision-making and not the social reality of decision-making itself (Kelly, 2003:3). In accordance with the theory, the players in the games of incomplete information know the rules of play. The players have numerous alternative solutions at their disposal in making choices when resolving a problem. Choices preferred by specific players are unique to themselves and are not known by other players. Since none of the players have knowledge of the others' game plan, none can predict with certainty the outcome of the game. The outcomes at the end of the game resemble preferences of a specific player and not of all the players in the game (Dillon, 1962).

The Game Theory model is the extension of individual rational decision-making described in the section on neo-classical economics, wherein behaviour of rational decision-makers affects others (Hayes, 2003.). There are gains to be made from the actions of individuals competing against each other or through a joint collaborative action of players bargaining among themselves (Cook et al., 2004). According to Osborne (2000), players engage in strategic, extensive or coalition games to address conflicting preferences. Strategic and extensive games, according to Osborne (2000), focus on actions of an individual player, while coalition games focus on the outcomes of a group of individuals. The strategic game commonly discussed in

literature is the prisoner's dilemma. The prisoner's dilemma usually uses the analogy of two suspects who cooperate and agree not to confess to the crime they committed. This allows them to reach a compromise payoff solution. The suspects can also decide to compete against each other. Competing against each other yields a less than optimal payoff solution, as both engaged in a non-zero-sum game where one's gain is at another's expense (Walker, 1959). Uncertainty and lack of complete information make it difficult for either of the suspects to know the strategy used by the other. Cooperation on the other hand, provides an incentive to free-ride, where one of the suspects decides to be dishonest and confess to the crime, hoping that the other party does not confess in order to obtain a maximum payoff.

The Game Theory provides a framework of studying problems that affect agricultural production (Dillon, 1962). Strategic games are common in the agricultural sector where in producers may individually compete against each other to gain access to output markets. In competing against each other, their interests are diverse, with each employing own strategy to outperform the other in accessing a particular market. In such a game, the farmer to some degree has control over the outcomes, following an evaluation of different strategies at his/her disposal. The farmer can enter into a contract with a future buyer of the product, reducing uncertainty by eliminating the price risk or sell on the market at a later stage. Following an evaluation of different strategies at their disposal, the strategy that is finally employed by the farmer is dictated to by the expected payoff.

The other option available to producers is to enter into coalition games in resolving the problems. Coalition games are mostly discussed under collective action theory in literature. According to Osborne (2000), coalition games focus on the outcomes achieved by groups of individuals together. Coalition games are underpinned by the interests of the players that converge. Players group together to form coalitions with the objective of gaining advantage from a collective effort as opposed to players as individuals (Hayes, 2003). With coalition games, instead of players competing against each other, they intentionally enter into mutual discussions and bargain among themselves to overcome diverse interests. This ensures that an optimum desirable payoff solution is attained. The decision by farmers to jointly buy into an agricultural processing plant is usually motivated by a common interest among the farmers to add value to the product in order to obtain high returns. Even though incentives to free-ride are always present in a group, Hansmann (1988) asserts that ownership of a firm by patrons reduces the incentives for opportunistic behaviour.

2.6 Investment problems in traditional cooperatives

Property rights are instruments by which any society controls and orders human interdependence and resolve the question of who gets what (Condon, 1987:14). According to Grashuis and Cook (2016), property rights are defined in terms of residual claims and residual rights of control. In accounting terms, residual claims generally come from the balance of the funds in a business after all other financial obligations have been met. Residual rights of control comprise decision-making and control of resources and assets of the organization (Nilsson, 2001). The principle of user owned and user control in traditional co-ops leads to loosely defined property rights. The property rights are collectively allocated to the farmer members without taking into consideration the amount of capital an individual invested in the co-op. As a result, none of the farmer members have a separate claim that is specific on the ownership of any of the assets in the co-op. The NIE literature identifies five institutional problems associated with cooperative enterprises: the free-rider, horizon, portfolio, control and influence problems (Cook, 2001; Nilsson, 2001; Sykuta & Chaddad, 2001). Control and influence problems are associated with control in the enterprise, while the free-rider, portfolio and horizon problems are broadly related to investments (Plunkett, 2005).

Ownership in a form of secure property rights is effective in providing economic agents with incentives to create, maintain and improve assets (Chaddad & Cook, 2004). The one-member-one-vote principle in co-ops gives every member an equal vote in decision-making and control of the co-op. In IOFs, decision-making and residual claims are proportional to the equity capital invested by each of the owners. The decision of the majority shareholders in the company rules and serves as an incentive for minority shareholders to increase their investment in the company. In the case of traditional co-ops where collectively owned property rights result in collective decision-making, the prospects of raising capital from farmer members are limited. A general tendency is for farmers to underinvest in the business (Staatz, 1987). The general investment problems of traditional co-ops are as follows:

2.6.1 Horizon problem

A horizon problem results from the limited planning horizons of the farmer members and the fact that residual rights are not transferable when members withdraw from the co-op (Nilsson, 2001). Residual claims in a co-op are not linked to the economic life of the underlying asset as in the case of IOFs. The members' residual claims are in line with the level of service they receive from the co-op. Benefits to the members from the capital investments made in a co-op

are over the time horizon when they are patrons. Patronage refunds cease to accrue to the member when membership terminates. The only claim that exiting members may have on the co-op is in the value of initial share contribution with nominal interest (Philips, 2003). Struggling co-ops, as is the case with most co-ops in South Africa, may find it difficult to pay members the initial value invested. As a strategy to minimize the potential losses, co-op members exert pressure on management to maximize per unit patronage refunds and minimize the net price paid (USDA, 2002; Royer, 2014). Indivisibility of co-op capital, as indicated by Philips (2003) is among the reasons most agricultural co-ops in South Africa voted to convert to limited liability companies in the late 1990s. The difficulty in raising equity capital as well as the horizon problem constrain farmer cooperatives from expansion and acquire new technologies in order to penetrate new markets.

2.6.2 Portfolio problem

Portfolio problems in cooperatives are a result of unallocated equity capital which is subjected to collective decision making (Nilsson, 2009). In the case of co-ops, residual claims are not freely tradable on the market due to a lack of secondary markets for the co-op shares. This according to the USDA (1994) leads to the adoption of a more risk-averse behaviour by participants as “investors” are locked in an investment without any prospects of diversifying the risk. Members are thus prevented from adjusting their cooperative asset portfolio to match their personal risk preferences because of non-transferability, illiquidity and lack of appreciation of cooperative financial instruments (Plunkett, 2005:37). Investors may have to assess the opportunity cost of investing in a co-op against other available alternative investments.

Democratic control of co-ops as stated in co-op principles, places limits on voting in relation to equity invested in a co-op. Furthermore, the tying of equity ownership to patronage places limits on dividend payments in accordance with equity invested in the cooperative (Staatz, 1987). In an IOF, investors receive share certificates as proof of ownership, thus giving them residual claims on the earnings of the firm for as long as the firm is in existence. Ownership is separate from management of the organization in an IOF. The firm’s stock value reflects the market’s expectation of the firm’s discounted future earnings stream (Sexton & Iskow, 1993). At a later stage, shareholders have an option to sell their shares on the open market and benefit from the appreciation in value of the asset. Alternatively, the shareholder can sell shares of a loss-making company and further invest where there are prospects of profits. This is not possible in

traditional co-ops, as future earnings of the business are tied to the patronage received by the members at the time. In a co-op, earnings are essentially only on a short time basis and related to the service the member currently receives.

Emana (2009) finds that cooperative unions in Ethiopia lack the liquidity and financial strength to sustain their operations. In most instances, businesses depend on outside capital to finance operations and growth. The aftermath of the 2007-8 crisis in financial markets increased the focus on risk management within the financial firms (Maingot, Quon & Zéghal, 2012). It therefore is difficult for co-ops to access funding from the banks as they follow stringent criteria to ensure that they are able to recover the capital, together with the interest. The cooperative unions in Ethiopia as asserted earlier in the study, are highly dependent on government support to access services such as bank credit, as well as foreign currency required to import inputs such as fertilizers and pesticides. On their own, without government support, sustainability of co-ops as a form of alternative investment vehicle for the farmers is a cause for concern.

2.6.3 Free-rider problem

The free-rider problem emerges when property rights are insecure, untradeable or unassigned (Cook, 1995; Menard, 2000). Assets in a co-op are owned collectively by the members, with the result that any individual action could result in negative consequences (Nilsson, 2001). In traditional co-ops where membership is open, members join and leave the enterprise freely as desired. When new members join the co-op, they immediately have access to the assets and benefits like all other members who have participated in the accumulation of the assets for many years. Essentially, the new members get to enjoy the benefits of an asset for which they did not contribute towards its financial investment; this is referred to as free-riding (Nilsson, 2001). Free-riding is also observed at a later stage in closed membership co-ops when capital for expansion is required and membership is opened to new entrants. The opportunity cost to older members is an investment in assets whose market value appreciates with time. Therefore, it is not surprising that members lean more towards providing the minimum investment possible in traditional co-ops.

External free-rider problem is also a problem in most instances. It arises when non-member producers who play in the open market realise that the co-op offers better prices and then decide to join the co-op as an afterthought (Cotteril, 1987). Non-members channel the product through the co-op when market prices are lower and benefit from higher prices negotiated on behalf of

the members. The members are also not immune to similar behaviour, where in some instances they opt to sell in the open market when prices are better than those offered by the co-op. Vorlaufer, Wollni and Mithöfer (2012) find free-riding to be common among coffee co-ops in Kenya.

2.7 Alternative cooperative models

Traditional models of cooperative enterprises have been criticized widely, mainly due to their inferior ownership structure (Van Bekkum & Bijman, 2006) or “vaguely defined property rights” (Sykuta & Chaddad, 2001:5). Classical co-op structures do not cater for the demands placed on the producer by the ever-changing food system and customer preferences. The modern food system by default directs the sector more towards industrialization. Producers have to adhere to the product standards as well as other demands imposed by the buyers. To some extent, adoption and application of modern technologies are requisite in meeting the product demands posed by the market. As a result, the sector gravitates more towards specialization in certain commodities as opposed to the diversified production practices of the past. Specialization allows the farmer to respond effectively to the growing needs of the consumer. Substantial investments in the form of capital are therefore necessary, in order to meet the operational needs as well as penetrate the lucrative and foreign food markets. Traditional co-ops are capital constrained as members tend to provide the minimum investment possible. Outside capital is also not easy to source under these structures, thus limiting their potential to grow.

Not all co-ops still follow the ICA principles as stipulated (Staatz, 1987). The new co-op structures have emerged in response to the challenges that limit incentives of members to invest in their own cooperatives. Alternative co-op ownership models allow co-ops to adapt to the changing market environment and respond to the customer needs to improve on profit prospects. The new structures have introduced innovative capital structures that often include external ownership (Van Bekkum & Bijman, 2006). Chaddad and Cook (2004) identify at least six different types of new co-op models, including the New Generation Co-ops (NGC), Proportional Investment Co-ops, Member-Investor Co-ops, Co-ops with capital-seeking entities, Investor-share co-ops and conversion to investor-oriented firm. The main difference between the classical forms of ownership models and the new ownership models is the voting rights and patronage (Harris, Stefanson & Fulton, 1996). NGCs are the most discussed in literature as institutional structures used in collective action to overcome investment problems

of traditional co-ops. A comparison between the classical ownership structure of co-ops and the New Generation Co-op is captured in Table 3.

Table 3: Traditional vs New Generation Cooperatives

Generic problems	Traditional Co-op	New Generation Co-op
Portfolio Problem	Investment decision is tied to patronage. Members often pressure co-op boards to structure assets to reduce risk.	Risk is aligned with members' strategic goals, as the risk profile is agreed on prior to the formation of the co-op. Members can trade shares and risk.
Horizon Problem	Lack of liquidity through secondary market for shares.	Stock can be traded to allow entry and exit from co-op as desired.
Free-Rider Problem	Individual benefits and property rights are poorly aligned. Open membership to all persons able to use their services and accept member responsibilities.	Investment and optimal levels of product flows are determined before the firm begins conducting business. Closed membership.
Control Problem	Information and external pressure from public share trading are absent.	NGCs seek greater property rights and alignment of risk via patronage-based voting.
Influence Cost Problem	Influence depends on centralization of authority and member homogeneity.	NGCs are centralized and limited to a specific purpose.

Source: Mazzarol, Limnios and Rebound (2011)

2.8 Cooperative performance

This study seeks to investigate the factors that determine performance of emerging agricultural co-ops in the nine provinces of South Africa. The study is, to a large extent, influenced by the high failure rate among emerging cooperatives in South Africa, despite a favourable policy environment. The DAFF reports that of the 1788 cooperatives on their database, only 32 percent are in operation. Karami and Rezaei-Moghaddam (2005) allude to the poor performance of cooperatives in Africa, which appears to be the norm. This study will assess performance of the co-ops deemed operational on the database of the DAFF.

2.8.1 *Defining cooperative performance*

Performance is a multi-faceted concept. Literature does not offer a standard definition or its standard measurement. The definition of performance in most instances is influenced by the area or the person who is defining it (Aminu & Shariff, 2015) or the field of study (Sandberg et al., 2002) cited in (Abdullahi, Abububakar, Aliyu & Umar, 2015). Barny (1991); Davidson (2004), cited in Eniola and Entebang (2015:239), define performance as “the strategic outcome that an organization uses to realize its goals, success or not”. Empirical studies use the words *performance* and *success* interchangeably as seen in the work by Karami and Rezaei-Moghaddam (2005). However, Akinruwa, Awolusi and Ibojo (2013) reached a conclusion that performance is synonymous to success.

In defining performance of a cooperative, Mayo (2011), Banaszak (2008), and Höhler and Kühl (2004) take into consideration the efficiency and effectiveness through which the co-op delivers value to the members. Performance in an IOF is measured in terms of the common objective shared by the members, which is mostly maximization of profits. Profitability indicators used to measure performance and management efficiency in an IOF include return on assets (ROA), return on investment (ROI), net profit and earnings per share (EPS). Cooperatives operate differently from IOFs and have a broader mandate to accomplish. In a similar manner to IOFs, co-ops have working and operational capital requirements. They employ personnel, have to source raw material and supplies and also keep up with repairs and maintenance of the plant. Profit is necessary for the co-op to sustain its activities, but is not the only motive behind the farmers banding together. The use of financial ratio analysis to evaluate cooperative performance omits the value of non-market benefits provided by the cooperative to its members and the community (Bond, 2009).

Performance of an agricultural co-op is associated with its continued ability to achieve the objectives set by the members at inception and as they evolve (Sexton & Iskow, 1988). The Cooperative Performance Committee stresses the importance of taking into consideration financial and non-financial measures when measuring performance of co-ops. Measuring performance of a co-op can be a daunting task, as non-financial objectives are not always as clear cut as financial objectives such as maximizing shareholder returns. There is a question around the standard against which performance should be measured as well as whose viewpoint should inform its measurement (Zeuli & Cropp, 2004; Chandeler & Hanks, 1993 cited in Onungu & Uzundu, 2015). However, Staatz (1987) indicates that cooperative members are best

positioned to articulate what constitutes its goals based on the compromise reached among members.

This study associates performance of an agricultural cooperative with its continued ability to achieve the objectives set by the members, such as increased incomes. Therefore, performance is measured against the co-op's ability to satisfy attributes such as (a) member commitment as determined by membership contribution, (b) manager attributes as determined by the level of education of the manager, (c) longevity depicted by the number of years that the co-op remains functional and in business, (d) wages paid, (e) access to finance in a form of loans, (f) training opportunities made available to members, (g) access to land, (h) co-operative structure factors depicted by the size of the membership as well as government support factors such as access to grant funding.

2.8.2 Empirical overview for performance factors

There are multi-dimensional aspects and approaches used in assessing performance factors of agricultural co-ops. In some studies, performance is assessed at a micro-level, looking at individual and organizational variables. According to Azadi, Hosseininia, Zarafshani, Heydari and Witlox (2010), this practice neglects the variables that may be important. On the other hand, some studies cluster variables into a specific category to provide a comprehensive analysis of the impact on performance. Due to the nature of the data available for the study, assessment of performance factors takes place at a micro-level. Turnover is the only dependent variable used in the measure of performance due to the nature of the data. For instance, the size of the membership is fairly constant throughout the years under observation, making it challenging to look at an increase in membership as a social measure of performance.

Karami and Rezaei-Moghaddam (2005) used the “determinants of APCs’ performance model” to model the determinants of agricultural production cooperatives performance in Iran. Independent variables are clustered into social, natural, government support, trust and co-op structure factors. Co-op structure factors include manager attributes such as education, while government support factors include loan and government aid. Using the manager attributes model yields a positive relationship between government support and the effective performance of agricultural cooperatives. In line with the findings by Banaszak (2008), the model depicts manager qualities and characteristics such as the level of education, job satisfaction and knowledge of the principles to positively impact on performance of a co-op. However, social

factors, which include solidarity among the members, yield little predictive results on performance.

Banaszak (2008) uses a probit model to study the determinants of successful cooperation in agricultural markets among a group of 60 selected producer co-ops or producer groups in Poland. The producers aim to organize the joint sale of output produced individually by the membership. Using hierarchical regression analysis, the results of this study found a strong association between co-op performance and government support factors and co-op structure factors. However, the manager qualifications had a weak positive relation with performance.

The approach followed by Azadi et al. (2010) in the analysis of factors that influence success of animal husbandry co-ops (AHC) in Iran aggregates the factor at a macro-level. Independent variables identified in the study include individual, structural, external and marketing factors. Individual factors place particular emphasis on demographic attributes of the manager such as education and age, while economic factors include costs, income and investments of the cooperative. The structural factors assessed in the study include the number of members in a co-op and years in operation and facilities, while external factors incorporate variables such as the level of development in an area as well as market access. The results of the study found a positive relationship between success and personal attributes, especially the expertise and skills of the managing director, given the complex nature of co-ops. Structural factors as shown by the number of years that the co-op has been in operation are not good predictors of performance. There is, however, an indication that some of the external factors such as market access have a positive impact on performance, while others yield a negative result.

The study by Adefila (2012) on the factors influencing the performance of 60 farmer cooperative organizations in the Gurara area of Niger State in Nigeria, uses simple statistical tools such as percentages, mean, standard deviation, frequencies and inferential statistics. Independent variables in the study include income, number of years farming, number of people enrolled and assessment of leadership. The results depict a positive relationship between the roles of farmers' co-ops and the variables under investigation, which include income per annum, experience in farming, population size, type of agricultural activity and quality of leadership as examined by the study.

Mubirigi, Shukla and Mbeche (2016) undertook a study on the assessment of the factors that influence performance, based on 244 cooperatives in Gatsibo district of Rwanda using

correlation and regression techniques. The variables under consideration include government support factors such as provision of subsidies, membership structure, training and skills. The results of the study found provision of subsidies to be negatively correlated with performance. Managerial skills have a strong positive correlation with performance.

A study by Amene (2017) on the assessment of factors that affect performance of agricultural cooperatives in the wheat market identified five broad categories into which exogenous performance factors are grouped. The categories of factors used in the analysis included: (i) marketing factors comprised of variables such as market information, market access, price, linkage, grading and processing; (ii) member value factors such as participation by members, awareness, loyalty, satisfaction, experience and decision-making; (iii) infrastructure factors include storage facilities, access to telephone services, access to electricity and transportation; (iv) financial factors include variables such as equity, recordkeeping, working capital, access to loans and credit; and (v) cooperative governance factors such as management skills, transparency and accountability, gender and management style. The endogenous factor's predictor manifested variables are growth in sales, marketing cost reduction, bargaining power and care for others. Conclusions of the study using the promax rotation method found a significantly positive relationship between the dependent variable and all independent variables. Among the financial factors, equity capital came out as the most significant, followed by access to loans.

A summary of the results of the studies is attached in Appendix 1.

CHAPTER 3. METHODOLOGY

3.1 Introduction

This chapter describes the methodology used in assessing the factors that determine performance of emerging agricultural cooperative enterprises in South Africa. The section is divided into five parts as follows: section 3.2 provides in detail the methodology used; the research design is discussed in section 3.3; the variable description and measure are discussed in section 3.4; while section 3.5 provides data analysis methods and section methodology and validity of the study, in section 3.6 provides limitations of the study.

3.2 Research methodology

According to Leedy and Ormrod (2015), research methodology is an approach that a researcher takes in carrying out their research project. It points out to the reader the philosophical assumptions that are the basis for the research as well as how the research was conducted (Quinlan, Babin, Carr, Griffin & Zikmund, 2015). Methodology is about understanding the entire research process, the context of its social organization, the philosophical assumptions made, ethical principles considered as well as the political impact of new knowledge from the research (Neuman, 2014). Furthermore, in this methodology, the researcher highlights tools that relate to research design, which include the population, sample used in the study, the sampling techniques, the data sources, the models considered, approaches to estimation, the statistical analysis as well as the limitations of the study.

3.2.1 *Quantitative approach*

This study adopted a quantitative approach. According to Bryman and Bell (2015:537), quantitative research places emphasis on quantifying data collection and its subsequent analysis. As a strategy used in research, quantitative research is deductivism, and objectivism nature incorporates a natural science model of the research process (particularly, one influenced by positivism). However, quantitative researchers do not subscribe to all three features at all times. Quantitative research also allows one to test objective theories by examining relationships between variables (Creswell, 2014). In this case, the researcher wanted to determine the impact of co-op structure factors, access to productive resources such as land, manager qualities, wages paid as well as location on performance of emerging agricultural co-ops. What makes this study quantitative is that the research was testing the theory that proposes

a relationship between the variables and the quantitative data analysis process as proposed by Neuman (2014). The process followed is shown in Figure 2.

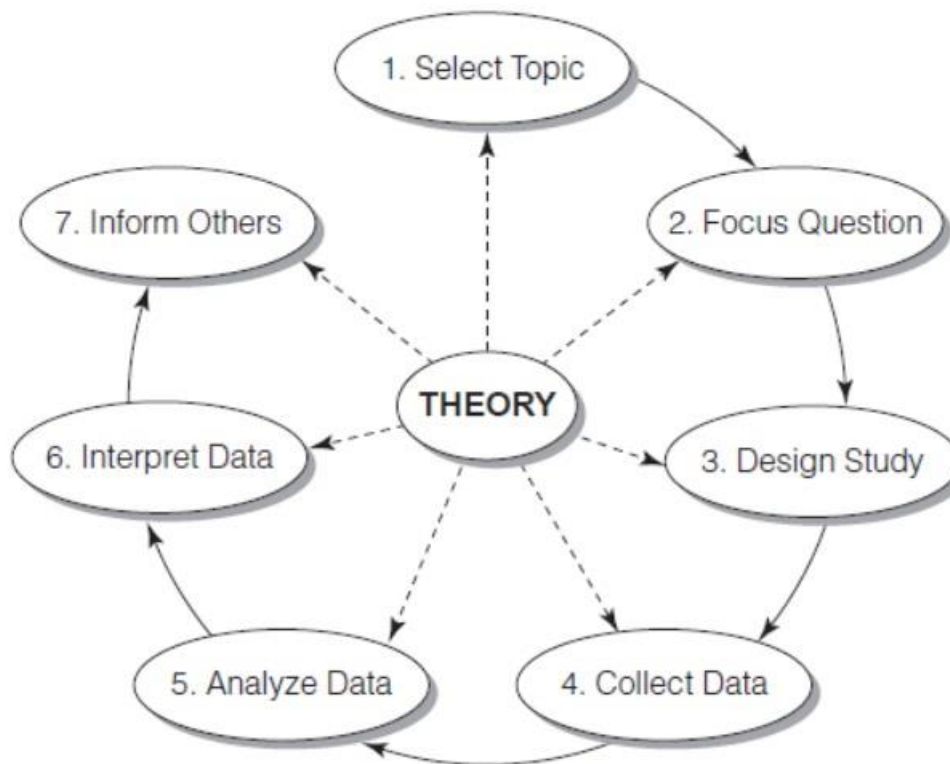


Figure 2: Steps in the Quantitative Research Process (Neuman, 2014:18)

The focus of a quantitative approach is to gather numeric data or gather data in number format (Quinlan et al., 2015). Furthermore, it involves measuring; for each variable there would be a score allocated to members in the sample (Punch, 2011:109). Adopting the quantitative approach enabled the researcher to obtain data that can be aggregated and summarized by statistical analysis and enabled her to generalize the results. However, the quantitative approach has its own weaknesses such as its dependence on prior theories which have been developed as well as the hypotheses. In this case, the researcher had to do a literature search and was able to find the theories and hypothesis related to the study. The researcher used the quantitative approach using secondary data captured in number format.

3.3 Research design

According to Saunders, Lewis and Thornhill (2016), a research design provides the structure for the collection of data and subsequent analysis, with the purpose of answering the questions posed by the research, also justifying the choice of data sources, methods of collection and techniques for analysing the data. The research design is the plan for meeting the objectives of the research and providing answers to questions (Cooper & Schindler, 2014). The researcher adopted descriptive research designs for this study. According to Leedy and Ormrod (2015), a descriptive research design enables researchers to draw logical conclusions related to prevailing conditions with regard to the situation or issue at hand, but not about detecting cause-and-effect relationships. It does not attempt to determine what causes the phenomenon, but simply provides its description (Salkind, 2018). In this case, the patterns and trend of the data were determined. Four descriptive research designs were found: observational studies, correlational research, survey research and developmental design (Leedy & Ormrod, 2014). The study adopted the developmental design.

The two types of developmental design are the cross-sectional design and the longitudinal design. A study that involves cross-sectional designs is conducted only once and provides information about a situation at a particular point in time, while the longitudinal study design includes repeat measures over time, noting the changes as they occurred on variables in the time period observed, panels or cohort groups are included (Cooper & Schindler, 2014). Longitudinal design was thus used for this research. In this case, data were obtained for each agricultural co-op that would have been in operation for at least have five years by 2017; therefore, starting in 2013. This means that some of the co-ops were a year old in 2013, while others were much older at the time. The choice of sample is motivated by the strong correlation that exists between the age of the business and its success. According to Mahembe (2011), most businesses fail within the first three years of business.

The advantage of using the longitudinal design is that it shows in detail how things developed over time, providing the possibility of comparing within the same groups, thus allowing continuity between groups that differ, making it possible for modified cause-and-effect speculation with regards to the relationship among the variables and also provides high comparability of groups (Salkind, 2018). The disadvantage is its expensive nature and its potential for a high dropout rate (Salkind, 2018). In this study, data were collected and there was no expense in data collection. According to McQueen and Knussen (2013), secondary data

are readily available, collected for previous research and not the current research; it can also be obtained from secondary sources. In this study, the researcher took 3 375 computer-generated observations and when the data were cleaned and outliers removed, there were 1 335 observations left that were ideal for performing a regression analysis.

3.3.1 Population and population size

Neuman (2014) defines a population as the theoretical representation of a group from which the researcher obtains a sample to generate generalized results. The target population for the study was emerging agricultural co-ops that have been in business for at least five years by 2017, registered on the Cooperative Data Analysis System (CODAS) of the DAFF. The CODAS is a web-based computer application designed to store, collate and analyse data on agricultural cooperatives in South Africa. Development of the system was informed by lack of a credible information management system for cooperatives in the sector. The system was developed with the assistance of the International Cooperative Alliance's (ICA) office for the Africa region, based in Nairobi, Kenya. The DAFF hosts the system on its server and has user rights controlled. The data on cooperatives in the sector are gathered by provincial departments of agriculture using a pre-determined questionnaire and captured on the system by the DAFF and in some instances by provincial staff. Captured data is updated annually to ensure reliability and accuracy. Data captured on the system is available to members of the public on request.

3.3.2 Sample size and population sampling techniques

Cooper and Schindler (2014) define a sample as carefully selected participants, be it cases or records, that represents the target population. In this study as mentioned earlier on, the population under investigation was identified as emerging agricultural co-ops registered on the CODAS of the DAFF that have been in operation for at least five years by 2017. A sampling frame or the working population, according to Quinlan et al. (2015), comprises a representative list (quasi-list) of elements of a population from which a sample is drawn. For the sample to be representative of the population, it is important for the sampling frame to include all (or nearly all) members of the population (Rubin & Babbie, 2016: 410). Sampling follows a process in which a few observations (a sample) are selected from a bigger group (the sampling population) such that they are a basis for estimation or prediction of the prevalence of unknown piece of information, be it a situation or outcome with regard to the bigger group (Kumar 2011:193).

The method of selecting a sampling frame may be based on a probability sampling or non-probability sampling, subject to the type of study (Bryman & Bell, 2015). Probability sampling is about selecting a member of the population without the knowledge of the probability of which one member will be selected. Probability samples are utilized in the quantitative approach. The parameters of interest to the researcher were emerging agricultural co-ops that have been in operation for at least five consecutive years from 2013 to 2017. The co-ops must have accurately captured information in the business analysis sheet on the variables considered by the study for analysis. Co-ops that have not been in operation for at least five consecutive years have been excluded from the study, including ‘those that are regarded as dormant’. The final sample size for the study was 1 335 co-ops. According to Hair, Black, Babin and Anderson (2018), a general rule for the sample size is a minimum ratio of five observations or each independent variable; however, between 15 to 20 observations for each independent variable are desirable. In this case, our independent variables were nine and thus a sample size of at least 220 was required.

3.3.3 Data sources

The study uses panel data of emerging agricultural co-ops captured on the CODAS of the DAFF. The variables studied in this study are discussed in section 3.4. The five-year period, which is an additional two years to the critical milestone associated with failure and success of a start-up business, was used as criterion in the selection of enterprises that participated in the study. All enterprises in the study had been active for at least five consecutive years. The assumption for the choice of the sample is that the co-ops which have been in business for at least five years have gained experience in running a successful enterprise.

3.3.4 Estimation approaches and model

Panel data comprise a group of cross-sectional units observed over time (Hill, Griffiths and Lim, 2007). According to Nwakuya and Ijomah (2017), it is a combination of time series and cross-sectional data, which means space and time dimensions are involved. Torres-Reyna (2007:3) asserts that panel data make it possible for the control of variables that one cannot see or measure, such as cultural factors or differences in business practices across companies, or variables that change over time but not across entities. Yaffee (2003) defines panel data analysis is a method of studying a certain subject within multiple sites, observed periodically over a defined time frame. This study was based on panel regression analysis, which is based on panel data obtained from the DAFF database. As mentioned earlier, the two dimensions to panel

cross-sectional and time series. According to Bala and Prada (2014), a regression model for panel data differs from an Ordinary Least Square (OLS) regression in that the information it provides takes into consideration both dimensions over individuals and over time. The general panel data model can be written as:

$$y_{it} = \alpha + \sum_{k=1}^k x_{it} \cdot \beta_{kit} + \varepsilon_{it}$$

where: $i = 1, \dots, N$, N is the number of cross-sectional dimension (or individuals).

$t = 1, \dots, T$, T is the number of time dimension (or period). In this case the individuals are co-op enterprises.

Estimation and inference problems posed by panel models include heteroscedasticity, autocorrelation and cross-correlation in cross-sectional units at the same point in time. The error components model (ECM) known as the fixed effects model (FEM) and the random effects model (REM) were used in resolving these problems.

According to Bollen and Brand (2010), popularity of these models comes from their ability to enable researcher control for all time-invariant, unmeasured (or latent) variables that influence the dependent variable, irrespective of whether they are known or not known. The random effects model assumes that effect that is peculiar to an individual is a random variable and is not correlated to the explanatory variables, while the fixed effects model assumes that the effect that is peculiar to an individual is a random variable and it is permitted to be correlated with the explanatory variables (Schmidheiny, 2018).

Hsiao (2003) asserts the greater efficiency of the REM as an advantage relative to the FEM. Hsiao further indicates that the random effects model leads to smaller standard errors of coefficients and provides a higher statistical power for detection of the effects. As a result, if subjects are subjected to a small change or no change across time, an FEM may have problems working accurately and a need for within-subject variability in the variables arises if subjects are used as their own controls (Allison, 2009). The author further indicates that should there be a small variability within subjects, the standard errors from FEMs may be too large to tolerate. A test was proposed by Hausman (1978), called the Hausman Test, to distinguish between the fixed effects model and the random effect model.

3.3.4.1 The fixed effect model

FEMs are used when analysing the impact of variables over time. According to Nwakuya and Ijomah (2017), the estimated coefficients of the FEM are unlikely to be biased as a result of omitted time-invariant characteristics such as gender, culture, etc. However, Stock and Watson (2007) indicate that changes in the dependent variable are likely to result from influences other than the fixed characteristics if the unobserved variables do not change over time. The rationale behind the FEM is that all the trials estimate the one value which is the only real value that exists for the treatment effect. Torres-Reyna (2007) asserts that the fixed effects explore relationship between outcome variables and predictor within an entity (country, person, company, etc.)

According to Torres-Reyna (2007), the assumption when using fixed effects is that within the individual, there is something that is likely to impact or bias the predictor or outcome variables. As a result, control of the impact is necessary as it forms the rationale for the basis of the assumption of the correlation between the entity's error term and the predictor variables. The author further indicates that due to fixed effects' ability to remove the time-invariant characteristics, it becomes possible to assess the net effect on outcome variable by predictors.

3.3.4.2 Random effects model

The reasoning behind the REM is the assumption that variation across entities or individual-specific effect is a random variable, not correlated with predictor variables (Greene, 2008). According to Torres-Reyna (2007:26), random effects assume a lack of correlation between an entity's error term with the predictors, thus enabling time variables to play a role as explanatory variables. Random effects' advantage lies in its inherent ability to include the time-invariant variables like gender, which differs from the fixed effects where all the time-invariant variables are absorbed by the intercept (Nwakuya & Ijomah, 2017). The authors further indicate a lack of correlation between the individual's error term and predictors, thus permitting time invariant variables to play a role as explanatory variables.

3.3.4.3 Hausman Test

In 1978, Hausman proposed the use of the Hausman Test when two consistent estimators differ in efficiency under the null hypothesis as well as under the alternative hypothesis of misspecification and divergent results (Pace & LeSage, 2008). The test evaluates the difference between two estimators which are consistent when the model is correctly specified, but which

differ when the model is incorrectly specified (Cameron & Trivedi, 2005). The authors further indicate that comparison between two different estimators to consider a test for endogeneity of a regressor in a single equation is the basis of the Hausman Test. According to Cameron and Trivedi (2005:271), two alternative estimators are the ordinary least squares (OLS) and two stage least square (2SLS) estimators where the 2SLS estimator use instruments to control possible endogeneity of the regressor. If endogeneity exists, the OLS is inconsistent and the two estimators will have different probability limits. In the absence of endogeneity, the two estimators have the same probability limit and both estimators are consistent.

The hypothesis test of the Hausman Test to determine whether to use a FEM are as follows.

- (a) H_0 : Preferred model is random effect
 H_1 : Preferred model is fixed effect

- (b) H_0 : Unique errors are not related to regressors
 H_1 : Unique errors are related to regressors

If the test is significant, that is, the $p - value < \alpha$, the null hypothesis is rejected and a FEM is fitted to the data. If the test is not significant, the random effect model is fitted to the data.

3.3.4.4 Steps taken in fitting the model

The steps proposed by Torres-Reyna (2007) were used to fit the model.

Step 1: Hausman Test specification test

The Hausman Test was conducted to determine if the FEM or a REM can be fitted. In this case, the test was very significant and the null hypothesis was rejected since the p-value was less than .05, t. Thus a FEM was fitted to the data.

Step 2: Testing for heteroscedasticity

The Wald tests for heteroscedasticity was used to determine whether the data had constant variance (homoscedasticity) or non-constant variance (heteroscedasticity). The hypothesis to be tested are:

$$H_0 : \quad \sigma_i^2 = \sigma^2 \text{ for all } i$$

$$H_1: \quad \sigma_i^2 \neq \sigma^2 \text{ for some } i$$

In this case, the test was significant and the data indicated that there was heteroscedasticity. As a result, the robust estimates had to be used.

Step 3: Testing for autocorrelation

The test for serial autocorrelation in the data was done using the Woolridge Test. The hypotheses for the test are:

$$H_0 : \quad \text{No first-order autocorrelation}$$

$$H_1: \quad \text{There is first order autocorrelation}$$

The test was not significant and therefore there was no serial correlation.

Step 4: Model specification

The model proposed by Athanasoglou, Brissimis and Delis (2005:12) was fitted to the data. The general model estimated was in the following linear form:

$$\Pi_{it} + c \sum_{k=1}^K \beta_k X_{it}^k + \varepsilon_{it}$$

and $\varepsilon_{it} = v_i + \mu_{it}$

where: Π_{it} is the turnover of the co-op i at time t , with $i=1; \dots, N; t=1; \dots, T$. c is a constant term, X_{it}^k s are k explanatory variables and ε_{it} is the disturbance with v_i the unobserved cooperative-specific effect and μ_{it} the idiosyncratic error. This is a one-way error component regression model. Where $v_i \sim IIN(0, \sigma_v^2)$ and independent of $u_{it} \sim IIN(0, \sigma_u^2)$.

In this case, the actual model to be fitted is as follows:

$$\begin{aligned} Turnover_{i,t} = & \beta_0 + \beta_1 Wages_{i,t} + \beta_2 Memb_{i,t} + \beta_3 Fee_{i,t} + \beta_4 Operation_{i,t} + \beta_5 Grant_{i,t} \\ & + \beta_6 Loan_{i,t} + \beta_7 Training_{i,t} + \beta_8 Land_{i,t} + \beta_9 Qual_{i,t} + \beta_{10} Urban_{i,t} + \varepsilon_{i,t} \end{aligned}$$

where:

$Turnover_{i,t}$ is Turnover

$Wages_{i,t}$ is Wages

$Memb_{i,t}$ is Membership

$Fee_{i,t}$ is Membership fee

$Operation_{i,t}$ is years in Operation

$Grant_{i,t}$ is Access to Grants

$Loan_{i,t}$ is Access to Loans

$Training_{i,t}$ is Training

$Land_{i,t}$ is Access to Land

$Qual_{i,t}$ is Manager Qualifications

$Urban_{i,t}$ is Classification of province according to urban or rural

β_0 is the average value of $Turnover_{i,t}$ when each of the independent variables $Wages_{i,t}$ $Urban_{i,t}$ equals 0.

β represents the average change in $Turnover_{i,t}$ expected to result from a change in one unit of any chosen independent variable, $Wages_{i,t}$... $Urban_{i,t}$ with all other variables held constant.

The subscript i captures an individual co-op and t captures the period under study.

A correlation matrix is conducted to determine the presence of collinearity among the independent variables. Increased levels of correlation among independent regression variables result in correlation coefficients becoming less reliable (Kothari, 2004). Furthermore, descriptive statistics such as the mean and standard deviation of all the variables will be discussed in the subsequent chapter. These figures will confirm and quantify or disquantify the differences in the variability of the variables considered. Inferential statistics were conducted using independent test and ANOVA to determine the variables that impact on turnover.

3.4 The variable description and measurement

3.4.1 The predictor variable

Annual turnover

This study regards annual turnover as a dependent variable and a performance measure for emerging agricultural co-ops in the study. Emerging co-ops in South Africa are fairly young and characterized by high failure rates. Unlike IOFs that seek to maximize profits, co-ops have diverse objectives and profit maximization is not the primary reason for existence. Mellor (2009) asserts that performance measures for young co-ops should remain simple before moving to more complex measures such as ratios and trends which are reserved for a later stage in the development of a co-op. In line with the young SMMEs, co-ops are likely to be deficient in accounting and record-keeping skills. In such instances, gross sales, gross expenses or operating costs as a percentage of costs are recommended as a measure of profitability and performance (Mellor, 2009). In the absence of essential elements in determining profitability and efficiency of the business such as information related to costs as well as assets owned by the co-ops, annual turnover was considered a suitable measure of performance in the study. Turnover is measured in terms of the value of total sales by the co-op or the value of the products sold on behalf of the members.

3.4.2 Explanatory variables

i. The level of education of the manager

Entrepreneur attributes such as the level of education form part of co-op structure factors and it is assumed that it is used as a dependent variable in the assessment of performance in the study by Karami and Rezaei-Moghaddam (2005). The level of education of the manager forms part of the elements of the manager qualities in a business. Human capital theory takes into consideration the skills, knowledge and abilities necessary for an individual to create economic value within an organization. The level of education of the manager is measured in accordance with the highest formal qualification attained by the manager. A distinction is made according to the level of education that managers indicated: basic education, high school education (matric), those who did not specify and those who did not receive any formal education. The study hypothesizes that the manager with higher qualifications will impact positively on performance. A more experienced and better educated manager is assumed to be more inclined to understand the benefits and importance of adopting new technologies as they become

available and also pursue other strategies that enhance performance of a co-op. However, the study only assesses qualifications of a manager, without incorporating experience.

Numeric values were assigned according to education levels, to distinguish managers with a primary education from those with matric and post-matric qualifications. Managers with no formal schooling were assigned the numeric value 0; those with primary school education were assigned 1; those with high school education were assigned 2, while those with post-matric qualifications were assigned 3.

ii. Size of the cooperative membership

The most important asset of co-op is its members; they own the co-op, use its services and control the overall activities of the co-op (Amene, 2017:413). The co-op membership consists of the actual number of individuals who are members in the co-op and they are an essential source of equity capital. Firm structure factors such as the size of the membership are assumed to be positively correlated to performance of the co-op. A study by Karami and Rezaei-Moghaddam (2005) and Banaszak (2008) used the size of membership as explanatory variable in the assessment of performance factors of co-ops. According to Karami and Rezaei-Moghaddam (2005), membership of the cooperative must be large enough to serve as a basis for building the enterprise. The study assumes that a larger membership in a co-op impacts positively on performance, given that the fixed costs are spread over a large volume of members. Some of the co-ops in the study have a significantly larger number of members compared to the rest and are therefore assumed to be secondary co-ops. One of the key assumptions under the large membership is the increased product volumes which are likely to result in increased sales.

iii. Wages paid

Wages refer to remuneration to all employees within the co-op, including the manager, for the work done on an annual basis. The unit of measure for the wages is the South African rand. The researcher has not come across empirical studies that used wages as an explanatory variable in the study of factors that determine performance of an agricultural co-op. The variable was computer generated and the researcher decided to use it in this study for the analysis. The results will be compared with those of other studies on performance of an IOF. In line with the expectations of the study, a successful co-op is one that is able to employ people and can afford

to pay the wages. It is envisaged that the relationship between the co-ops' ability to pay wages and turnover (income) will be positive.

iv. Access to loans

Finance is the lifeline of the business, it enables the business to acquire raw materials, capital assets and pay wages. The poor growth experience by small businesses is linked to the difficulty experienced in accessing finance (Fowowe, 2017). As finance becomes available and accessible to the business, productivity improves, growth is experienced and so are employment opportunities. This ultimately contributes to development in general. Three groups were identified under this variable, two of which are, those who accessed loans and those who did not access loans. The members of a specific group did not specify whether they accessed loans and, in the final analysis of the data, they were grouped with those who did not access loans. This was influenced by the low prospects of access within the emerging agricultural co-op sector. Access to loan funding is assumed to impact positively on performance of a co-op.

v. Access to government grant

This study regards grant funding as a government support factor to emerging agricultural co-ops. Access to grants is an explanatory factor in the study, measured in terms of those who accessed the grants and those who did not access the grants. There were those who did not specify whether they did not have access to grants from government. Government provides financial incentives to co-ops in the form of grant funding. The grant support is a crucial source of start-up capital for emerging co-ops. Furthermore, grant funding caters for various needs, which include infrastructure development and the purchase of production inputs such as fertilizers and animal feed. In most instances, government does deposit cash into the account of the co-op, but pays invoices to the suppliers on the approved items. The hypothesis of the study is that government support factors such as the grant funding improve performance of a co-op.

vi. Membership fees

Membership fees are the monies paid by the members up front upon joining the co-op. The fees serve as a commitment from the member and also as equity capital for the enterprise to acquire or finance assets and operations. A co-op where members do not contribute membership fees lacks a solid foundation on which a strong membership is formed (Dejene, 2015). The amount of the fees paid by the member is usually stipulated in the documents of incorporation of the

co-op. In the absence of data that detail the assets owned by the co-ops observed in the study, co-ops where members contributed towards the membership fees are assumed to have a better equity base than those whose members did not contribute towards payment of the fees. As a result, membership fees are hypothesized to have a positive impact on performance of an emerging agricultural co-op.

vii. Training and skills development

Training and skills development (training) refer to the commitment by the co-op to expose its members to training. Through training and skills development, co-operators are empowered to understand crucial agricultural and business practices. Training of the members benefits the co-op when the newly acquired practices are adopted and put into practice. In the study by Dejene (2015), participation of the members in technical training is among the structural factors used as explanatory variables in performance of a co-op. This study is comprised of co-ops that expose members to training and those that do not. It means that co-operators who are exposed to training and skills development initiatives have the potential to impact positively on performance of the co-op. In accordance with the study, a successful co-op is one where members have a technical expertise based on the skills acquired through the training. Prakash (2000) lists education and training of staff among the conditions necessary for success of cooperatives.

viii. Access to land

Land is among the most important factors of production in agricultural production. Access to land (land) is a categorical variable, comprised of those who have a title deed or have a bond registered over the property, those under a lease agreement, those on tribal or communal land and those who did not specify the tenure arrangements. Access to land as a determinant of performance indicator is found in the paper by Verhofstadt and Maertens (2014). Different systems under which tenure is arranged might have an economic impact on the co-op by either encouraging or discouraging investments. The study hypothesizes that access to land positively impacts on performance of a co-op. Co-ops were classified according to those who have access to land through communal or tribal arrangements, lease agreements and through mortgage. Some of the co-ops in the study failed to specify the tenure arrangements.

ix. *Years in operation*

The number of years that an enterprise has been in business in the study are the actual years that the co-op has been in operation. Accumulated years in practice provide an added advantage of gained core competencies necessary to improve performance (Mathuva & Kiweu, 2016). In measuring years in operation, the actual numerical values which indicate the actual number of years that the co-ops have been in business since 2013 to 2017 are used. It is hypothesized that the longer the co-op has been in business, the better it will perform, in line with the strong correlation mentioned in literature between the age of the business and its success.

x. *Urban-rural location*

Rural or urban classification of co-ops was brought into the study in order to compare the performance of co-op based on location of the co-op. Classification of provinces is informed by the Stats SA (2001) who established that the Western Cape (WC), Northern Cape (NC), Gauteng province (GP) and the Free State (FS) comprise mostly urban dwellers, while the Eastern Cape (EC), Limpopo (Lim), KwaZulu-Natal (KZN), North-West (NW) and Mpumalanga (MPL) provinces consist mostly of rural dwellers. Provinces which are mostly rural such as the EC, Lim and KZN are characterized by high incidences of poverty as opposed to mostly urban provinces. They also have the biggest proportion of the population involved in agriculture (Stats SA, 2016).

3.5 Data analysis

Babbie (2017) describes quantitative data analysis as numerical representation and manipulation of observations with the aim of providing a description and explanation to the phenomena reflected by the observations. The first step of the analysis of the data was to export it into a database. The data were exported into Microsoft Excel 2016. The data were cleaned by removing any co-ops with no information. Furthermore, it was cleaned by ensuring that all co-ops had data for the dependent variable, turnover for five years from 2013 to 2017. The data were then exported to SPSS and a missing-value analysis was done to determine which of the dependent variables had more than 5 percent missing information as proposed by Hair et al. (2018). In this case, the variables with missing data were membership (*Memb*), number of years in operation (*Oper*) and managers' qualification (*Qual*) with 1.1 percent, 10.9 percent and 44.2 percent missing values respectively. In this case, number of years in operation and managers' qualification had more than 5 percent missing values. Thus, the researcher fitted three models,

one with all the independent variables, the other with managers' qualification missing and the other with both managers' qualification and number of years in operation missing.

There were also cleaned of outliers. According to Hoaglin and Iglewicz 1986), the best way to identify outliers is by calculating 2.2IQR (Interquartile range). Anything lower than $Q1 - 2.2IQR$ was an outlier and anything greater than $Q3 + 2.2IQR$ was an outlier, where $Q1$ and $Q3$ were the lower and upper quartile, respectively. The values which were outliers were replaced using the winsorising method, meaning the researcher replaces on the right with the largest value that is not an outlier and on the left with the smallest value that is not an outlier.

3.5.1 Descriptive statistical analysis

According to Jackson (2014), descriptive statistics are numerical measures; they base their description of a distribution by providing information on the central tendency of the distribution, the width of the distribution and the shape of the distribution. Graphical and numerical techniques are the two forms of descriptive statistics encountered in literature. Keller (2018) indicates that graphical techniques permit data to be present in such a way that it is easy for the reader to extract useful information, while numerical techniques summarize data used as measures of central tendency or location (mean, median and mode), measures of position or standing (deciles, quartiles and percentiles), measures of spread or variability (variance, standard deviation and range) and measures of relative standing (coefficient of variation). This study presented descriptive statistics for qualitative variables in the form of frequencies and proportions while, for descriptive statistics for quantitative variables, the study presented them in the form of means, median, standard deviations and coefficient of variation.

The mean, sometimes called the arithmetic average, is the commonly used measure of central tendency, defined as a measure of the average data value for a data set (Davis, Pecar & Santana, 2014). It is obtained by adding together all the observations and dividing the answer by the total number of observations. The median measures central tendency, it is the middle score in a distribution when the scores are arranged in ascending order or descending (from lowest to the highest or from the highest to the lowest). The mean and the median were used to show the value that depicts the value at the centre of the distribution. The mean is affected by outliers or numbers that are extreme values. In this case, the median was also used since it is not affected by outliers.

The standard deviation was measured using variability or dispersion. The standard deviation measures variation; the average difference between the scores in the distribution and deviation from the mean (Jackson, 2014). When the standard deviation is high, it means that the data are more dispersed, while a lower standard deviation indicate that they are closer to each other (Babbie, 2017:432). According to Keller (2018:101), the empirical rule states that nearly “68 percent of all observations fall within one standard deviation of the mean ($\bar{x} \pm s$), approximately 95 percent of all observations within two standard deviation of the mean ($\bar{x} \pm 2s$) and approximately 99.7 percent of observations fall within three standard deviations of the mean ($\bar{x} \pm 3s$).” The coefficient of variation was used to determine variability across continuous variables. According to Keller and Gaciu (2015 the coefficient of variation of a set of observations is the standard deviation of the observations, divided by their mean, which can be expressed as a percentage. Zero coefficient of variation means no variability. A variable with a coefficient of variation close to 0 percent is considered to have low variability and is thus more consistent.

3.5.2 Inferential statistical analysis

Inferential statistics is a body of methods used to conclude on or infer characteristics of populations using the sample data as a base for analysis (Keller, 2018). The inferential statistics completed were independent t-tests, One-way ANOVA, correlation and panel regression using the FEM. The inferential statistics tests were done at the 5 percent level of significance using the p-value. The level of significance is probability of rejecting a true hypothesis, i.e. the probability of committing a type I error, where type I error is when the null hypothesis is rejected, when in actual fact it is true. The p-value of a test is the probability of observing a test statistic at least as extreme as the one computed given that the null hypothesis is true (Keller, 2018). A comparison was made between the p-value and the level of significance, should the p-value be less than the level of significance, the test is described as significant. In this case, a p-value less than .05 would lead to the rejection of the null hypothesis. A p-value less than .01 would indicate a much higher significant test.

3.5.2.1 Independent t-test

An independent t-test is a statistical technique which compares the mean score for two groups consisting of some interval or ratio scale using a less-than interval classificatory variable (Quinlan et al., 2015:363). According to Davis et al. (2014), two populations are regarded as independent when measured values of the items observed in both populations do not affect each

other. The assumptions of the t-tests are that the observations in any of the samples have to be independent, the two populations from which the samples are selected must be normal and their variance must be equal (Gravetter & Wallnau, 2017). In this case, the co-ops were independent from each other and the central limit theorem was used to achieve normality. The central limit theorem states that “as the sample size (the number of values in each sample) gets large enough, the sampling distribution of the mean is approximately normally distributed; this is true regardless of the shape of the distribution of the individual values in the population,” (Levine, Szabat & Stephan, 2016: 255).

The Levene’s test of homogeneity of equality of variance was used to assess whether the variances of the two groups are equal. In this study, for instance, the two groups related to access to loans in the study are the co-ops that accessed loans and those that did not access loans. If the p-value was less than .05, it means the test was significant. Then, statistics under equal variances not assumed were discussed and if the test was not significant (p-value more than .05), statistics under equal variances assumed were discussed. The hypothesis to be tested was:

H₀: The means are equal ($\mu_1 = \mu_2$) against

H₁: The means differ ($\mu_1 \neq \mu_2$)

- The effect size

The effect size was used to measure the significance of the relationship. The effect size is defined as the proportion of variance in the dependent variable that is accounted for by the manipulation of the independent variable (Jackson, 2014). It indicates the amount of influence changing the conditions of the independent variable had on dependent scores (Heiman, 2015). The effect size, denoted by η^2 (eta-squared), is the effect size for an independent t-test defined as:

$$\eta^2 = \frac{t^2}{t^2 + (N_1 + N_2 - 2)}$$

where:

t^2 = t-value squared;

N_1 = Sample size for first group

N_2 = Sample size for second group

Note: The guidelines proposed by Cohen (1988:284-7) for interpreting eta-squared, η^2 are:

- .01 = small effect
- .06 = moderate effect
- .14 = large effect

3.5.2.2 Analysis of variance (ANOVA)

Keller (2018) indicates that the technique is derived from the manner in which the calculations are performed. In this study, the technique analyses the variance of the data to determine the possibility of making the inference of the population means being different. The ANOVA procedure seeks to determine which differences exist between two or more population means. The name of the technique is based on the way the calculations are performed (Keller, 2018). ANOVA is made up of analytic procedure whose basis is comparing two estimates of variance. The one estimate derived from the differences among scores within each of the groups is considered random or error estimate, the second estimate comes from differences in group means and is considered a reflection of group differences or treatment effects plus error (Tabachnick & Fidell, 2014:70). Tabachnick and Fidell (2014) indicate that should there be no differences between the two estimates of variance, a conclusion can be reached indicating that means in all of the group come from the same sampling distribution of means. The authors further indicate that the slight differences among the group means result from a random error. If there is homogeneity among groups, one would be able to generalize.

The F-test is the ratio of the variance associated with differences among sample means in the numerator and the variance associated with errors in the denominator and it is used to determine the difference among variances (Tabachnick & Fidell, 2014). The ANOVA has the same assumptions as the independent t-tests.

The null hypothesis to be tested was:

H_0 : The means are equal

H_1 : At least one of the pairs of means is different

The Levene's tests of homogeneity of variance was used to determine equal variances across group. In the case where the variances were equal (homogeneity), the F-test was used to determine mean differences and in the case where the variances were not equal (heterogeneity), a robust test for equality of means called Welch test was used to determine difference in means. The Welch robust test of equality of means is an alternative to the traditional analysis of variance (ANOVA). It does not assume the means to be equal, as a result it not affected by unequal means.

Additional hypothesis tests done after an ANOVA, the post hoc test (post-tests), determine the exact mean difference that are both significant and not significant (Gravetter & Wallnau, 2017). The post hoc test is dependent on whether the assumption of equal variance was met. Where the variances were equal, the Scheffe post hoc test was used as a test and the Games-Howell test used in the case of unequal variances. The Scheffe post hoc method computes possible contrast that exists between means and the type 1 error is at most α for any of the possible combinations, it is therefore a conservative test (Brown, 2005). The Scheffe test is a possible post hoc test distinct for being among the fastest of all (with the smallest risk of type I error), it evaluates the significance of the difference between any two treatment conditions using the F-ratio (Gravetter & Wallnau, 2017).

The Games-Howell (GH) procedure is an extension of the Tucky Kramer test. The Games-Howell method gives the best performance for pairwise comparisons (Shingala & Rajyaguru, 2015). De Muth (2014) regards Games-Howell as an extension of the Tukey-Kramer test, recommended when sample sizes are greater than five. The test, according to De Muth (2014), is a pairwise procedure whose basis is the q-distribution and is:

If the variances are equal, the effects size for ANOVA is computed by the Greek letter *eta* squared, η^2 and according to Jackson (2014), eta squared (η^2), is given by:

$$\eta^2 = \frac{SS_{Between}}{SS_{Total}}$$

where $SS_{Between}$ is the sum of squares between groups which reflects the differences between the means from the various levels of an independent variable and SS_{Total} is the sum of squares for total which reflects the total differences between all scores in the experiment. Eta squared, η^2 , reflects the proportion of the total differences in the scores that are associated with differences between sample means or how much of the variability in the dependent variable is attributable to the manipulation of the independent variable (Jackson, 2014:234).

If the variances were not equal and the Welch F test was used, the effect size was calculated using the adjusted omega squared, meaning omega-squared (ω^2) given by:

$$\omega^2 = \frac{df_{bet}(F - 1)}{df_{bet}(F - 1) + N_T}$$

where df_{bet} is the degrees of freedom for factor A, that is, the number of levels of factor A – 1, F is the Welch F test statistic and N_T is the total number of subjects (Keppel and Wickens, 2004).

Note: The guidelines proposed by Cohen (1988) for interpreting eta-squared, η^2 and omega-squared (ω^2) are:

- .01 = small effect
- .06 = moderate effect
- .14 = large effect

3.5.2.3 Confidence interval error bars

According to Cumming, Fidler and Vaux (2007) the mean of the data, with standard error (SE) or confidence interval error bars give an indication of the region where you can expect the mean of the whole possible set of results, or the whole population, μ , to lie. The authors indicate that the confidence interval error bars show a range of values you can be 95 percent confident contains the true mean. The confidence interval error bars were used to show diagrammatically which groups differ. Groups that had confidence intervals that overlap showed that they were not statistically significant. The more they overlap the more similar they are.

3.5.2.4 Correlation analysis

The correlation coefficient (r) was used to measure the extent of the relationship between variables. Hair et al. (2018) assert that a correlation coefficient is a coefficient that indicates the strength of association between any two metric variables and the value ranges from +1 to -1, where +1 indicates a perfect positive relationship, 0 indicates no relationship and -1 indicates a negative relationship or reverse relationship (as one variable grows larger, the other variable grows smaller). The purpose of the correlation analysis was to determine how the dependent variable turnover was related to the independent variables. Cohen (1988) states in the guidelines that, if $r = .10 - .29$ then there is a low effect (low correlation); $r = .30 - .49$ has a

medium effect (moderate correlation) and $r = .50 - .99$ has a large effect (strong correlation).

3.5.2.5 *The fixed effect model*

Analysis of the impact of variables that vary over time was conducted using the fixed effects model (FE). Panel regression analysis was performed to determine which variables impacted on turnover the most. The regression coefficients of the regression analysis are called betas. According to Hair et al. (2018), the estimated regression coefficients called betas are standardized regression coefficients that allow for a direct comparison between coefficients as to their relative explanatory power to the dependent variable. The authors indicated that the sign of the coefficient indicates the type of relationship, whether the relationship is positive or negative. Furthermore, the authors also indicate that the value of the coefficients show the amount of change of the in the dependent variable as the independent variable changes by one unit. The hypothesis to be tested was:

$$H_0: \beta_i = 0$$

$$H_1: \beta_i \neq 0$$

If the p-value of the beta coefficient was less than .05, it would mean that the null hypothesis that the regression coefficient is zero was rejected. It is then correct to say the variable contributed significantly to the prediction of the dependent variable, turnover. A negative coefficient is a sign that the impact on the dependent variable is negative or it decreases, while a positive co-efficient signals an increase or positive impact on the dependent variable.

The effect size was measured by the coefficient of determination. According to Davis et al. (2014), the coefficient of determination (r^2) was given by:

$$R^2 = \frac{SS_{Between}}{SS_{Total}}$$

where $SS_{Between}$ is the sum of squares between groups, it reflects the differences between the means from the various levels of an independent variable and SS_{Total} is the sum of squares for total, which reflects the total differences between all scores in the experiment. Coefficient of determination, R^2 measures the amount of variation in the dependent variable explained by the variation in the independent variable (Keller, 2018:120).

3.6 Limitations of the study

This study, like any other of this nature has a few of the challenges briefly discussed below:

- Due to limitation of information on the CODAs, the study uses turnover as a measure for performance of a co-op. Information on costs is unavailable, perhaps a result of poor record management associated with SMEs (Ajibade & Khayundi, 2017). Alternative variables that could be used to measure performance include the growth in membership. However, in the case of the co-ops on the system, membership is constant per co-op throughout the years under consideration.
- The information on the system does not indicate the type of training that the members of the co-ops undertook.
- There are indications that participating co-ops have the tendency to under-report on the financial aspects of their business, especially when information is required by government. The motivation behind such partial disclosure is the perception that if correct information is disclosed, the enterprises might be deprived of further government support as they will be assumed to be self-sufficient and reliant. There may be biases in the results based on such under-reporting. The study however, considers the information provided by enterprises as a true reflection of what is going on in the businesses.
- Government supports co-ops through contracts to supply the school feeding schemes. Some of the co-ops in the study may have had the advantage of having secured such contracts. There is evidence of variability as shown by income ranging from R2 000 to R1 000 236. Furthermore, the co-ops have not been differentiated into primary and secondary co-ops, which can impact on the generalization of the results.
- Wages as an explanatory variable is not widely used in literature on co-ops, the results will be compared to those of an IOF.

3.7 Conclusion

This section provided in detail the methods and techniques that were applied in the theoretical analysis of panel data obtained from the CODAS of the DAFF on emerging agricultural co-ops in South Africa. The section also provided a detailed description of the variables to be considered for analysis.

CHAPTER 4. RESEARCH FINDINGS AND ANALYSIS

4.1 Introduction

This chapter presents the results of the factors that determine the performance of emerging agricultural co-ops in South Africa. Annual balanced panel data are used, with all variables observed for each time period and cross-section. This study made use of time series data from the period 2013 to 2017 and cross-section segment by the agricultural co-ops. There is one main research question comprising sub-questions, which the study sought to address. The main question of the study is to find out about the factors that determine performance of emerging agricultural cooperatives in South Africa, this is followed by the sub-questions that seek to determine the role that government support factors play in the performance of emerging agricultural cooperatives, followed by the assessment of the impact of the factors of cooperative structure on performance of emerging agricultural cooperatives and lastly, to determine whether there is a difference in performance between emerging cooperatives located in provinces that consist mainly of rural areas and those in the provinces regarded as mostly urban.

The first section of the results presents the descriptive statistics of the selected variables and the correlation analysis to determine how the continuous variables relate to each other and to the dependent variable. The third part presents the estimated models, followed by the independent tests to determine how variables with two categories impact on performance. This is then followed by a one-way analysis of variance to determine how categorical variables with more than three categories impact on performance. TURNOVER in rands was used as a measure of performance. Since the variables had large values, the dependent variable was transformed to natural logarithms. Natural logarithms were also applied to the variable wages and membership fee.

When estimating the model, the Hausman Test was used to determine whether to use the FEM or the REM. The results of the test indicated the FEM to be the appropriate model to be fitted to the data. Panel data were subsequently diagnosed for the presence of autocorrelation and heteroscedasticity. The regression was conducted to quantify the magnitude of the impact of the explanatory variables on LNTURNOVER. The model was then fitted to the data for the dependent variable using continuous explanatory and categorical variables. Dummy variables for the categorical variables, access to grant (GRANT), access to loans (LOAN), Type of training (TRAINING) access to land (LAND) and manager's qualification (QUAL) were created as mentioned in the methodology section.

Before regression of performance determinants is performed, a test should be conducted to test the appropriateness of the panel data across time periods (both time-series and cross-section data) based on certain criteria. Descriptive statistics in the form of frequencies, proportions, minimum, maximum, mean, median, standard deviation and the coefficient of variations were used to determine trends and patterns of the data and will be discussed in the following section.

4.2 Descriptive statistics of variables

Descriptive statistics must be conducted before any reliability, validation and further analysis for collected data are established (Pallent, 2007).

4.2.1 Characteristics of the categorical variables

There were 285 emerging cooperative enterprises that participated in the study, each with five-year data values from 2013 to 2017, making a total of 1425 yearly values. The categorical variables for the study included co-ops that received a grant and those that did not; those that received loans and those that did not; those whose members received training and those that did not; those that farm on communal, leased or mortgaged land; the manager’s qualifications and the co-ops distinguished according to rural-urban classification. Table 4 presents characteristics of the categorical variables.

Table 4: Characteristics of the categorical variables

Variable	Category	Frequency	Percent
Access to grant	No	629	44.1
	Yes	796	55.9
	Total	1425	100
Access to loans	None	547	38.4
	Named	65	4.6
	Not specified	813	57.1
	Total	1425	100.
Received training	No	570	40
	Yes	855	60
	Total	1425	100
Access to land	Not specified	1219	85.5
	Bonded/Title deed	41	2.9

Variable	Category	Frequency	Percent
	Communal/Tribal land	128	9
	Lease agreement	37	2.6
	Total	1425	100
Managers attributes	Non-formal training programmes	65	8.1
	Primary	124	15.4
	Secondary	57	7.1
	Tertiary	559	69.4
	Total	805	100
Classification of co-op	Rural based	735	51.6
	Urban based	690	48.4
	Total	1425	100
Province	Eastern Cape	125	8.8
	Gauteng	225	15.8
	Free State	75	5.3
	KwaZulu-Natal	320	22.5
	Northern Cape	295	20.7
	Western Cape	95	6.7
	Limpopo	160	11.2%
	North West	130	9.1
	Total	1425	100

The results of the study indicated that agricultural co-ops that had access to grants were 55.9 percent (n=796), while 44.1 percent (n=629) did not have access. The ratio of those with access to a grant and those without access was thus almost 1:1. However, the co-ops that accessed a grant are slightly more by just under 3 percent. According to this study, grant funding is regarded as a government support factor. As a result, the results indicated that almost half of

the co-ops received support from government. The observation based on the percentage of co-ops that receive grant funding, suggests that a majority of smallholder farmers are unable or reluctant to invest in their farming systems to boost production as observed by Pienaar and Traub (2015).

In 60 percent (n=855) of the co-ops, the members received training, while in 40 percent (n=570), the members did not receive training. This indicates that most of the co-ops in the study exposed their members to training and skills development. It is not surprising that most of the co-ops provide training and skills development to their members. Training is an important aspect in the success of the co-op, in some instances it is the attraction behind people joining a co-op. Training provides members with an opportunity to acquire knowledge on technical aspects of production, such as fertilizer application, diseases and pest management (Mubigiri, Shukla & Mbeche, 2016).

A majority of the co-ops had access to land, but did not specify the nature of tenure arrangements, in total 85.5 percent (n=1219). Only 9 percent (n=12) indicated that they farm on communal or tribal land. The remainder of the co-ops, either have bond or title deed on the land, thus giving ownership of the land at 2.9 percent (n=41) and 2.6 percent for lease agreements (n=37). The data are highly skewed towards the co-ops who did not specify the nature of tenure arrangements. Perhaps the co-ops that did not specify tenure arrangements are those on land purchased under the land reform programme and the option was not provided on the business analysis forms used to capture information.

With access to loans, a total of 95.4 percent (n=547) had no access to loans, while 4.6 percent (n=65) had access to loans. Of those who did not have access to loans, about 57.1 percent (n=813) are the co-ops who did not specify if they had a loan, but assumed to have not had a loan in the study. It can be noted that very few emerging agricultural co-ops tend to access loans, in this case only 5 percent. Smallholder farmer-specific characteristics such as lack of fixed assets to serve as collateral as well as conditions imposed by financial institutions, serve as impediments to accessing finance. Regasa, Fieldiang and Roberts (2017) also found low levels of access to external credit by firms in Ethiopia, with only 0.7 and 0.8 percent of working and fixed capital respectively, being financed through loans.

There were 43.5 percent of the co-ops who did not indicate the manager's qualification. Of those who indicated the manager's qualification, about 69.4 percent (n=559) had a tertiary qualification, 7.1 percent (n=57) had a secondary qualification, 15.4 percent (n=124) had a

primary qualification, while 8.1 percent (n=65) did not have any formal training. It can be noted that most of the people who indicated their qualification had tertiary qualifications.

With regard to location of the co-ops, about 51.6 percent (n=735) of the co-ops were based in a province with a high proportion of rural dwellers (mostly rural), while 48.4 percent (n=690) were located in a province with a high proportion of urban dwellers (mostly urban). NC and GP, despite being mostly urban provinces, have the second and third highest number of co-ops respectively. Proximity to markets as well as the infrastructure could be playing a role in the high number of co-ops in the province.

In accordance with the methodology of this study, an analysis was conducted on the performance of emerging agricultural co-ops in the nine provinces of South Africa. After cleaning the data, MPL did not have enough co-ops with complete records for the period under consideration, from 2013 to 2017. Therefore, this province was excluded from the analysis, leaving the study to focus on eight provinces. About 22.5 percent (n=320) were from KZN, 20.7 percent (n=295) were from NC, 15.8 percent (n=225) were from GP and 11.2 percent (n=160) were from Lim. Other co-ops were from the EC, FS, WC and NW with proportions of 8.8 percent, 5.3 percent, 6.7 percent and 9.1 percent, respectively.

4.3 Characteristics of the categorical variables

Descriptive statistics of the continuous variables are shown in Table 5 in the form of the mean, median, maximum, minimum, standard deviation and coefficient variation of the data. The purpose of these statistics is merely to indicate the centre and the spread of the data used in the study, thus giving an idea of what the data looks like. After preparing the data for analysis, descriptive statistics were presented.

Table 5: Descriptive statistics of continuous variables 2013-2017

Summary statistics	Continuous variables				
	TURNOVER	Membership (MEMB)	WAGES	Member fee (FEE)	No. of years in operation (OPER)
Mean	R261 338.74	8.98	R33 056.46	R3 885.68	6.18
Median	R150 000.00	7	R22 000.00	R2 500.00	5.00

Summary statistics	Continuous variables				
	TURNOVER	Membership (MEMB)	WAGES	Member fee (FEE)	No. of years in operation (OPER)
Standard deviation	R284 691.03	5.132	R31 473.992	R3 975.162	3.536
Minimum	R2 000	5	R300	R120	1
Maximum	R1 000 236	21	R110 000	R12 500	16
Coefficient of variation	91.80%	57.15%	95.21%	102.30%	57.22%
Skewness	1.484	1.368	1.284	1.171	-.711
Kurtosis	1.221	.638	.703	.159	.150
Shapiro Wilk Test of normality	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$

As shown in Table 5, performance of cooperatives was measured by the TURNOVER of the co-op. Turnover ranged from R2 000 to R1 000 236 giving a range of R998 236, thus indicating larger variability across co-ops. The average turnover was R261 338.74, with a standard deviation of R284 691.03, giving a coefficient of variation of 91.80 percent. It can be noted that there is higher variability in turnover among the co-ops. It is believed that some of the co-ops in the country are able to secure contracts with government to supply the school feeding schemes. Those co-ops with government contracts may be contributing to such high variability in turnover. This is also supported by the fact that the data were positively skewed with at least half of the co-ops having a turnover of R150 000 and less. This resulted in the distribution of the turnovers being skewed as supported by a skewness of 1.484. Positive skewness values indicate the clustering of scores towards the left of the graph (Leedy & Ormrod, 2015). It is evident from the study that some of the co-ops have very low turnover to make a meaningful impact and be sustainable as fully fledged businesses in line with the observations by Adefila (2012). *

The study indicates that the membership for each co-op ranges from five members to 21, the average membership is nine. At least 50 percent of the co-ops have a membership of seven people or fewer. The standard deviation is 5.13 and a coefficient of variation of 57.15 percent, which is far away from the 0 percent, which implies no variability and suggests that our variability is higher. The membership was further skewed and peaked as supported by the skewness and kurtosis of 1.368 and .638, respectively. Positive kurtosis values indicate that distribution along the graph is peaked with long thin tails (Pallant, 2001). Membership is therefore not normally distributed. The baseline study by the dti (2001) indicates that a majority (about 65 percent) of the co-ops in South Africa have a membership of fewer than 10 people, with less than 12 percent of them with a membership in excess of 100 members. Clustering of primary co-ops into secondary co-ops to capitalize on market opportunities may be a contributing factor to the large variability in membership. Banaszak (2008) also finds a large variability in member sizes of producer groups in Poland.

The wages of the co-ops ranged from R300 to R110 000, giving a range of R109 700 citing a large variability. This is also supported by a standard deviation of R31 473.99, giving a coefficient of variation of 95 percent, which is far from 0 percent when there is no variability. The average wages paid by the co-ops were R33 056.46. This indicates that on average, the co-ops spend close to R33 000 a year in wages and at least 50 percent of the co-ops incur wages of R22 000. Wages were also heavily skewed and peaked with skewness and kurtosis of 1.284 and .703 respectively, thus data was not normally distributed. This suggests that some of the co-ops can barely afford to create sustainable employment.

Membership fees represent commitment from members as they join the co-ops. The results indicated that membership fees contributed ranged from R120 to R12 500, giving a range of R12 380 with a standard deviation of R3 975.162 and a coefficient of variation of 102.3 percent, citing larger variability. This shows the large difference in membership fee contribution among the co-ops. The average membership fee and median were R3 885.68 and R2 500, respectively. At least 50 percent of the co-ops received R2 500 in membership fees. On average, the members contributed R3 975.16 annually in membership fees. The variability can once more be explained by the number of primary producer co-ops who probably bind together to form a secondary co-op in order to pursue market opportunities.

The number of years that the co-ops have been in operation ranges from 1 to 16 years. It means that some of the co-ops had their first year of operation in 2013. The average mean was 6.33

years and with a median of 5. The standard deviation was 4.19 giving a coefficient of variation of 66.19 percent. This shows that the majority of the co-operatives have not been in existence for a long time. The development of a majority of emerging cooperatives in South Africa was influenced by the new policy in 2005 which is more inclusive (dti, 2001).

4.4 Correlation analysis

The extent of the relationship between the dependent and independent variables was established through the Pearson’s correlation coefficient. The Pearson correlation measures the degree and the direction of the linear relationship between the variables (Gravetter & Wallnau, 2017). According to Hair, Black, Babin and Anderson (2010), correlation coefficient indicates the strength of the association between two metric variables, where + or – indicates the direction of the relationship. The values range from -1 to 1, with 1 indicating perfect correlation among the variables, irrespective of the sign and a correlation of 0 indicating that no relationship exists between the two variables (Pallant, 2001). Table 6 shows the results of the correlations analysis between the dependent variable TURNOVER and the explanatory continuous variables. As mentioned in the methodology, Cohen (1988) stated that if $r = .10 - .29$ then there is a low effect (low correlation); $r = .30 - .49$ has a medium effect (moderate correlation) and $r = .50 - .99$ has a large effect (strong correlation). The hypothesis test was set at the 5 percent level of significance. A p-value of less than .05 would lead to the rejection of the null hypothesis indicating lack of correlation, while a p-value of less than .01 indicated that the correlations were highly significant.

Table 6: Correlation analysis of TURNOVER with the explanatory variables

Construct	Mean	TURNO VER	MEMEB RESHIP	WAGES	MEMER SHIP FEE	NUMBE R OF YEARS
1. TURNOVER	261 338.74	-				
2. MEMBERSHIP	8.98	.148**	-			
3. WAGES	33 056.46	.730**	.085**	-		
4. MEMBERSHIP FEE	3 885.68	.296**	.251**	.034	-	

5. NUMBER IN YEARS OPERATION	6.18	-.068*	.260**	-.018	-.010	-
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The results depicted the initial statistically significant strong positive correlation of the dependent variable TURNOVER with wages ($r = .730, p < .01$). From these results, it is shown that high levels of turnover are associated with high levels of wages. Thus, the co-ops with high performance are associated with high levels of wages, probably due to the large number of employees employed by the business. TURNOVER had a weak statistically significant positive relationship with MEMBERSHIP ($r = .296, p < .01$) and MEMBERSHIP FEE ($r = .251, p < .01$). There was a weak statistically significant relationship between TURNOVER and OPER (number of years in operation).

The results in Table 6 show no evidence of strong correlations between the independent variables. Multicollinearity occurs when a single independent variable is highly correlated with a set of other independent variables (Hair et al., 2014), $r = .9$ and above (Pallant, 2007). All correlations are less than .3. The independent variable MEMBERSHIP had a statistical significant weak positive correlation with WAGES ($r = .085, p < .01$) and MEMBERSHIP FEES ($r = .243, p < .01$). WAGES also has a weak association with MEMBERSHIP FEE ($r = .251, p < .01$). It can be concluded that there are no high correlations among the independent variables.

4.5 Regression analysis models

In order to determine the factors that impact on the performance of emerging agricultural co-operatives, the relationship between performance (TURNOVER) and the identified determinants, three econometric models were fitted to the data. Firstly, the dependent variable TURNOVER model is fitted with all independent variables; secondly without manager's qualification and the third model without manager's qualification and number of years in operation. The models were formulated from theory and are given below:

TURNOVER model 1: All independent variables

$$\begin{aligned} LnTurnover_{i,t} = & \beta_0 + \beta_1 LnWages + \beta_2 LnMemb_{i,t} + \beta_3 LnFee_{i,t} + \beta_4 Operation_{i,t} + \\ & \beta_5 Grant_{i,t} + \beta_6 Loan_{i,t} + \beta_7 Training_{i,t} + \beta_8 Land_{i,t} + \beta_9 Qual_{i,t} + \varepsilon_{i,t} \end{aligned}$$

TURNOVER model 2: All independent variables except manager's qualification

$$\begin{aligned} LnTurnover_{i,t} = & \beta_0 + \beta_1 LnWages + \beta_2 LnMemb_{i,t} + \beta_3 LnFee_{i,t} + \beta_4 Operation_{i,t} \\ & + \beta_5 Grant_{i,t} + \beta_6 Loan_{i,t} + \beta_7 Training_{i,t} + \beta_8 Land_{i,t} + \varepsilon_{i,t} \end{aligned}$$

TURNOVER model 3: All independent variables except manager's qualification and number of years in operation

$$\begin{aligned} LnTurnover_{i,t} = & \beta_0 + \beta_1 LnWages + \beta_2 LnMemb_{i,t} + \beta_3 LnFee_{i,t} + \beta_4 Operation_{i,t} + \\ & \beta_5 Grant_{i,t} + \beta_6 Loan_{i,t} + \beta_7 Training_{i,t} + \beta_8 Land_{i,t} + \varepsilon_{i,t} \end{aligned}$$

where i = entity and t =time.

In this case, the managers' qualification and number of years in operation had a lot of missing observations which are more than 5 percent, as mentioned in the methodology. With panel data being used in this study, the first test conducted was the Hausman Test to determine if the model was fixed effects (FE) or random effects (RE).

4.5.1 Hausman Test for the models

The Hausman Test was used to decide whether to use an FEM or an REM by identifying the presence of endogeneity in the explanatory variables (Sheytanova, 2014). The Hausman Test tests the null hypothesis that the preferred model is random effects versus the alternative which is the fixed effects (Greene, 2008). The null hypothesis is:

H_0 : ε_{it} is not correlated with X_i (random-effects model is appropriate)

H_1 : ε_{it} is correlated with X_i (fixed-effects model is appropriate)

According to Torres-Reyna (2007), the Hausman Test tests whether the unique errors (ε_{it}) are correlated with the regressors. The null hypothesis is they are not. Table 7 shows the results of the three models.

Table 7: Hausman Test for the models

Summary statistic		Model 1	Model 2	Model 3
Chi-sq statistic (χ^2)		70.23	179.98	107.73
Chi-sq. d.f		7	6	5

Prob (p-value)		$p < .001$	$p < .001$	$p < .001$
Decision		Reject H_0	Reject H_0	Reject H_0

The p-values in all the models are highly significant at less than .01, thus leading to the rejection of the null hypothesis that the random effects model is appropriate. It can be concluded that all the three models were FEMs. The cross-section FEM was therefore appropriate.

4.5.2 Diagnostic tests for the fixed effects model

The data was tested for heteroscedasticity using Wald tests for group-wise heteroscedasticity and autocorrelation was tested using Woolridge test for autocorrelation in panel data.

4.5.2.1 Testing for heteroscedasticity for the models

The Wald tests for heteroscedasticity tests the null hypothesis that there is homoscedasticity (or constant variance). The results of the test for constant variance are shown in Table 8 and the hypothesis to be tested are:

$$H_0 : \quad \sigma_i^2 = \sigma^2 \text{ for all } i$$

$$H_1 : \quad \sigma_i^2 \neq \sigma^2 \text{ for some } i$$

Table 8: Wald test for group-wise heteroscedasticity for the models

Test summary	Model 1	Model 2	Model 3
Chi-sq statistic (χ^2)	3.5×10^6	3.4×10^5	5.3×10^9
Chi-sq. d.f	149	250	282
Prob (p-value)	$p < .001$	$p < .001$	$p < .001$
Decision	Reject H_0	Reject H_0	Reject H_0

All three the p-values are less than .05 and the null hypothesis for homoscedasticity is rejected, that is, the constant variance and it is concluded that there is a presence of heteroscedasticity in the data. Heteroscedasticity can cause difficulties in regression analyses as it invalidates the

significance tests for regressions (Martins & Lucado, 2015). Therefore, this calls for robust estimation in all the three models.

4.5.2.2 *Testing for autocorrelation for the models*

The Woolridge Test for autocorrelation was done to test the null hypothesis that there is no serial autocorrelation. Results of the tests are shown in. Table 9.

- H_0 : No first-order autocorrelation
- H_1 : There is first order autocorrelation

Table 9: Woolridge Test for autocorrelation for the models

Test summary	Model 1	Model 2	Model 3
F-statistic (F)	8.351	13.077	19.679
d.f	(1, 148)	(1, 249)	(1, 281)
Prob > F (p-value)	$p = .004$	$p < .001$	$p < .001$
Decision	Reject H_0	Reject H_0	Reject H_0

Looking at Table 9: Woolridge Test for autocorrelation for the models

all the p-values are less than .05 and the null hypothesis of no first order correlations is rejected. It can be concluded that there is serial correlation in the data. Therefore, the robust estimators should be used.

4.5.3 *The fitted fixed effects regression models*

Looking at the diagnostic test results, the data had heteroscedasticity and was not auto-correlated. Robust standard error estimates for linear panel models were used for the data. The FEM was therefore fitted with robust standard errors.

4.5.3.1 *Model 1 with TURNOVER as the dependent variable with all the variables*

The membership fee, access to loans and rural-urban-based classification of co-ops were omitted from the model due to collinearity in the panel data. Table 10 summarizes the results for TURNOVER model using all the independent variables.

Table 10: Regression results: LNTURNOVER dependent variable with all variables

Explanatory variable	Coefficients	Robust std. err	T	P> t
MEMB	-.0001	.0098	.01	.994
LNWAGES	.5101	.0683	7.47	$p < .001$
GRANT	-.1197	.0987	-1.21	.227
TRAINING	-.363	.0479	-7.58	$p < .001$
LAND	-.0474	.0346	1.37	.174
OPER	.0904	.0142	6.39	$p < .001$
QUAL	-.1102	.1151	-0.96	.340
_cons	6.7429	.6515	10.35	$p < .001$

From the regression results, the variables that do not have an influence on TURNOVER are membership, access to grant and qualification of managers. The results further indicate that access to grant has no influence on TURNOVER. This is in contradiction to our expectation and also rejects the result of the study by Karami and Rezaei-Moghaddam (2005) who find government support factors to impact positively on performance of a co-op. However, the outcome is in line with the findings of the study by Mubigiri et al. (2016) who find a significantly negative correlation between performance of an agricultural co-op and subsidy provision from government or donor agencies. Perhaps opportunistic behaviour from people who join co-ops to access government incentives may play a role in the finding.

The variables that impact significantly on TURNOVER are wages (WAGES), training (TRAINING) and number of years in operation (OPER). All the variables are highly significant at 1 percent level of significance. Since the dependent variable was log transformed, the coefficients are interpreted in the context of the geometric mean rather than the arithmetic mean. For every 10 percent increase in wages, performance increases by 4.98 percent ($1.10^{.5101}=1.0498$). The expected percent decrease in geometric mean from those with training to those without is about 30.4 percent ($\exp(-.363)=.696$) holding other variables constant.

The number of years in practice allows for the acquisition of skills and experience necessary for the efficient running of the enterprise and improving performance (Mathuva & Kiweu, 2016). The results of the study indicated that as the years of operation increased by one unit, performance increased by 9.5 percent. Therefore, the number of years in operation had a positive impact on performance. The constant had a geometric mean of R848.02 ($\exp(6.7429)$). Thus the expected geometric mean of TURNOVER is R848.02.

4.5.3.2 Model 2: TURNOVER as the dependent variable without manager’s qualifications

The manager’s qualification had about 43.5 percent missing information. Since the missing information was more than 5 percent, the model was fitted without the variable. The model omitted membership fee, access to loans and rural-urban-based classification of co-ops due to collinearity in the panel data. Table 11 summarizes the results for TURNOVER model using all the independent variables, except managers’ qualification.

Table 11: Regression results: LNTURNOVER dependent variable with all variables except for manager qualification

Explanatory variable	Coefficients	Robust std. err	T	P> t
MEMB	-.0121	.0073	-1.65	.101
LNWAGES	.3764	.0557	6.76	$p < .001$
GRANT	-.2212	.0812	-2.73	.007
TRAINING	-.3190	.0611	-5.22	$p < .001$
LAND	.0217	.0310	0.70	.484
OPER	.0818	.0112	7.33	$p < .001$
_cons	7.9654	.5344	14.91	$p < .001$

Looking at Table 11, membership and access to land do not have an impact on the performance of the co-op. The variables that impact significantly on TURNOVER are wages (WAGES), access to grant (GRANT), access to training (TRAINING) and the number of years in operation (OPER), in confirmation of the results obtained in the previous section. All the variables are significant at the 5 percent level of significance with WAGES, TRAINING and OPER being

highly significant. A 10 percent increase in wages results in expected increase in performance of 3.65 percent ($1.10.3764=1.0365$).

The expected percentage decrease in geometric mean from those with access to grant to those without is about 19.8 percent [$\exp(-.2212)= .802$] holding other variables constant. Access to grant funding or rather government support factor, does not support our hypothesis that government support factors have a positive impact on success of emerging agricultural co-ops. In fact, the results point to the contrary and find a statistically weak negative relationship between performance and outside assistance such as subsidies from government or donor agencies. It is not immediately clear what could have influenced the outcome, given that smallholder producers are poor and government support is critical in providing start-up capital. Perhaps this is an indication of co-ops that start due to government influence as well as the incentives made available. Secondly, it could be that members lack an identity with the co-op and are therefore always looking at government to intervene without being willing to contribute financially towards the operations of the co-op.

The expected percentage decrease in geometric mean from those with training to those without training is about 27.3 percent [$\exp(-.319)= .727$], holding other variables constant. The number of years in operation had a positive impact on performance. As the years in operation increase by one unit, performance increase by 8.5 percent ($\exp(.0818)= 1.085$). The result confirms the finding previously on the number of years in operation. The constant had a geometric mean of R2 979.58 ($\exp(7.9654)$). Thus, the expected geometric mean of TURNOVER is R2 979.58.

4.5.3.3 Model 3: Turnover as the dependent variable with all the independent variables except manager qualifications and number of years in operation

Membership fee, access to loans and rural-urban-based classification of co-op were omitted from the model due to collinearity in the panel data. The table summarizes the results for TURNOVER model using all the variables except managers' qualification and number of years in operation. The results are shown in Table 12.

Table 12: Regression results: LTURNOVER dependent variable with all variables except manager qualification and number of years in operation

Explanatory Variable	Coefficients	Robust std. err	T-value	P> t
MEMB	-.0034	.0078	-.44	.663
LNWAGES	.4759	.0507	9.38	$p < .001$
GRANT	-.0736	.0773	-.95	.342
TRAINING	-.3111	.1586	-1.96	.051
LAND	-.0458	.0287	-1.59	.112
_cons	7.3964	.5295	13.97	$p < .001$

Looking at Table 12, membership (MEMB), access to grant (GRANT), training (TRAINING) and access to land (LAND) do not have an impact on performance of the co-op. The variable that impacts significantly on TURNOVER is wages (WAGES) and it is significant at 5 percent level of significance. A 10 percent increase in wages results in an expected increase of 4.64 percent ($1.10^{.4759}=1.0464$) in performance. The constant had a geometric mean of R1 630.11 [$\exp(7.3964)$]. As a result, the expected geometric mean of TURNOVER is R1 630.11.

Looking at the three models the variables that impact significantly on TURNOVER are membership (MEMB), wages (WAGES), training (TRAINING) and number of years in operation (OPER). Membership and training tend to have a negative effect while wages and number of years in operation tend to have a positive effect.

4.6 Independent t-tests to determine performance determinants

The independent t-test was used to determine whether performance differed by access to grant, access to loans, type of training, access to land and whether the co-op is located in a province composed mainly of rural dwellers or urban dwellers. There are three assumptions made by the independent t-test, firstly the tests assume that observations within each sample must be independent; secondly, the two populations from which the sample are selected must be normal and third assumption is that of equal variances (Gravetter & Wallnau, 2017). Independence was

met since the observations were randomly selected. Normality was achieved by using the central limit since the observations were more than 30.

Levene’s test of homogeneity of variances are the most robust when we have skewed data and are highly sensitive to variations in distribution. The test was used to determine whether the variances were equal. In cases where the variances were equal, statistics under equal variances assumed were discussed and in cases where the variances were not equal, statistics under equal variance not assumed were discussed. The independent t-test was performed at the 5 percent level of significance and the null hypothesis was rejected if the p-value was significant or less than .05. The test was highly significant if p-value is less than .01. The assumption of equal variance was tested using the Levene’s test for equality of variance and all p-values were greater than .05 except for access to grants, access to loans and rural-urban classification of co-ops in terms of province. In this case, statistics under equal variances not assumed were discussed for the variables. The test of equality of means are shown in Table 13.

Table 13: Independent t-test to determine impact on performance

Variable	Group	Group statistics			Levene’s Test for Equality of Variances		T-test for Equality of Means		
		N	Mean	Std deviation	F	Sig	Equal Variances	t-value	Sig (2-tailed p-score)
GRANT	No	629	257 672.59	294 621.91	6.388	.012	Assumed	-.432	.666
	Yes	796	264 235.73	276 744.13			Not	-.429	.668
LOAN	No	1360	259 533.58	280 423.95	15.019	$p < .001$	Assumed	-1.095	.274
	Yes	65	299 108.06	363 320.30			Not	-.866	.390

Variable	Group	Group statistics			Levene's Test for Equality of Variances		T-test for Equality of Means		
		N	Mean	Std deviation	F	Sig	Equal Variances	t-value	Sig (2-tailed p-score)
TRAINING	No	570	270 566.86	313 599.33	31.541	$p < .001$	Assumed	.999	.318
	Yes	855	255 186.65	263 676.95			Not	.965	.335
LAND	No	1219	267 417.59	289 678.09	7.264	.007	Assumed	1.963	.050
	Yes	206	225 367.24	250 809.79			Not	2.174	.030
QUAL	Non-tertiary	246	251 458.27	262 580.93	16.656	$p < .001$	Assumed	-2.361	.018
	Tertiary	559	306 274.79	319 767.56			Not	-2.547	.011
URBAN	Rural	735	266 508.92	283 662.51	.825	.364	Assumed	.707	.479
	Urban	690	255 831.37	285 885.41			Not	.707	.480

The independent t-tests indicated that access to grants (GRANT), access to loans (LOAN), access to training (TRAINING) and classification of a co-op in terms of province being rural or urban (URBAN) had no significant impact on performance. Access to land (LAND) and manager qualification (QUAL) had a significant impact on performance.

In terms of access to land, there was a difference in mean scores between those who had access to land under a specific tenure arrangement and those who did not specify the tenure arrangement, with a p-value of .030 ($t(305.232) = 2.174, p = .030$), leading to the difference in means. The mean score and standard deviation for those who specified the tenure

arrangements were ($M= 225\,367.24$, $SD = 250\,809.79$), while for those who did not specify the tenure arrangement were ($M= 267\,417.59$, $SD = 289\,678.09$). The magnitude of the difference in the means (mean difference = $42\,050.35$, 95% CI : $3\,985.15$ to $80\,115.55$) was of a small effect ($\eta^2 = .2$). Those who have specified the type of tenure arrangements had a significantly lower mean than those who have not specified the type of tenure arrangements as shown in the confidence interval error bars shown in Figure 3 below.

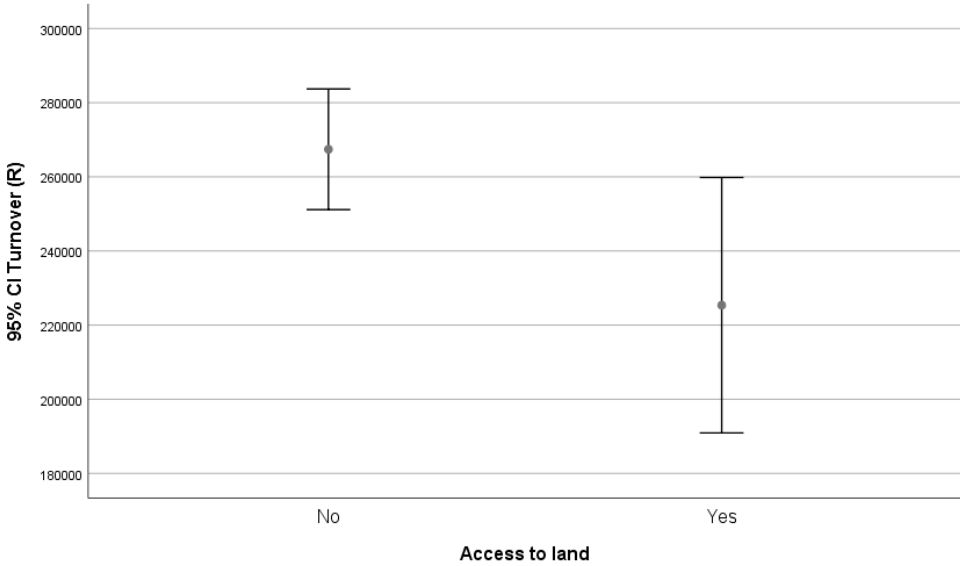


Figure 3: Confidence interval error bars for TURNOVER by access to land

The confidence interval error bars are slightly overlapping, showing that there is a difference in means. Those who did not specify the nature of tenure arrangements tend to perform better than those who have specified the tenure arrangements. There is larger variability or rather dispersion for those who specified the nature of tenure than those who did not specify.

Manager’s qualification had a p-value of .011 ($t(563.718) = -2.547$, $p = .011$), which is less than .05, thus the means were significantly different. The means and standard deviations for those who did not have a tertiary qualification was ($M= 251\,458.27$, $SD = 262\,580.93$) and those who had a tertiary qualification it was ($M= 306\,274.79$, $SD = 319\,767.56$), respectively. The magnitude of the difference in the means (mean difference = $-54\,816.52$, 95% CI : $-97\,089.69$ to $-12\,543.36$) was of a small effect ($\eta^2 = .01$). The confidence interval error bar is shown in Figure 4.

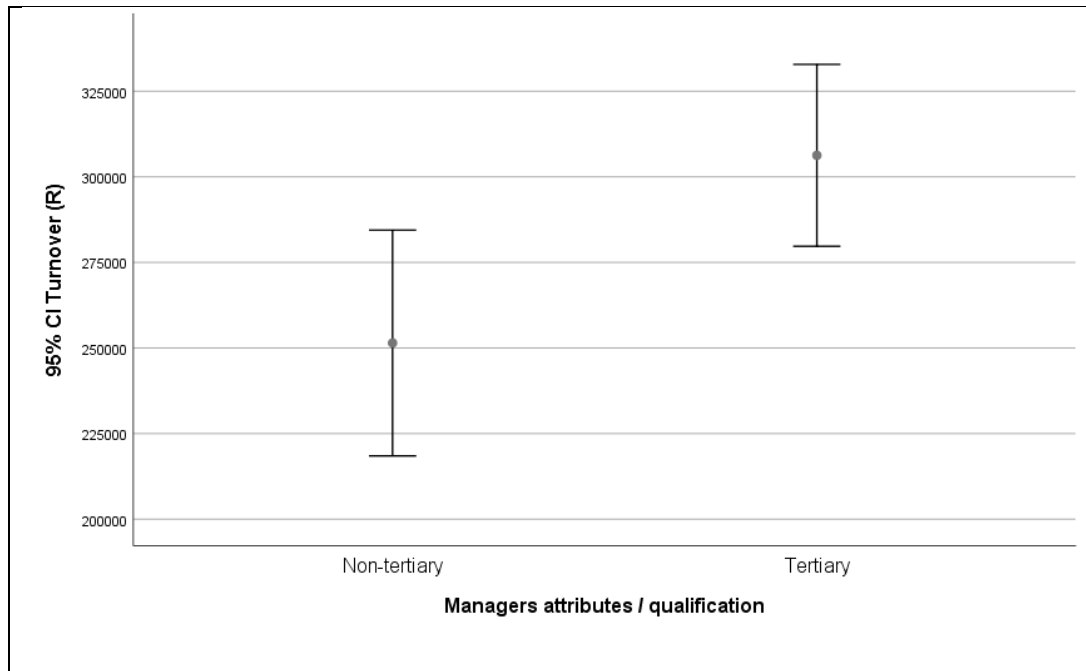


Figure 4: Confidence interval error bars for performance by manager qualification

Looking at Figure 4, there is no overlap in the confidence interval error bars from those who had tertiary qualifications and those who did not. Those with a tertiary qualification had a significantly higher mean than those without. Manager qualification had a positive effect on performance of the co-op. However, the length of the error bar for those who did not have a tertiary qualification showed that there was larger variability in performance than those who had a tertiary. Those who did not have tertiary qualification tend to have upper limit of turnover below R300 000 while those with tertiary qualifications tended to have the lower limit of turnover above R275 000. Therefore, the managers with a tertiary qualification recorded the highest turnover or, rather, had the highest performance. This finding is in line with the expectations of the study and is also corroborated by some studies (Dejene & Getachew, 2015; Adefi & Okurut, 2008).

4.7 ANOVA tests to determine the determinants of performance

A one-way analysis of variance (ANOVA) was conducted to determine whether the variables province, access to loans, access to land and manager qualifications had an impact on performance. The same assumptions as the independent t-tests applied. In the case where the assumption of equal variance was violated and the test was significant, the Welch robust test of equality of means was used and the Games-Howell test was used as a post hoc test. In the case where the tests of homogeneity were not significant (p-value more than .05), the Tukey b post

hoc tests was used to determine where the differences lie. The ANOVA test results are presented in the next subsection.

The Levene's test of homogeneity of variances resulted in all tests having p-values less than .05 for provinces, access to loans, access to land and manager qualifications, with p-values of less than .001, less than .001, 013 and .001. In this case, the Welch Robust tests for equality of means was used. The results of the Welch tests are shown in Table 14.

Table 14: Welch robust test to determine determinants of performance

Variable	Test	Statistic	df1	df2	Sig.
Province	Welch	65.538	7	457.268	$p < .001$
	Brown-Forsythe	62.493	7	936.041	$p < .001$
Access to loan	Welch	51.059	2	166.203	$p < .001$
	Brown-Forsythe	39.683	2	175.438	$p < .001$
Access to land	Welch	2.994	3	90.457	.035
	Brown-Forsythe	2.984	3	149.457	.033
Manager's qualification	Welch	2.500	3	151.034	.062
	Brown-Forsythe	2.515	3	263.595	.059

All the variables had a significant impact on performance, except for manager qualifications. Province, access to loan and access to land were determinant factors on TURNOVER. Results for ANOVA tests for performance by province indicated significant difference ($F(7,1417) = 62.425, p < .001$). However, as a result of the unequal variances, the Welch robust test of equality of means was used to determine whether indeed the differences do exist. The Welch robust test resulted in a p-value less than .001 ($F(7,457.268) = 65.538, p < .001$) and thus the mean performances were significantly different across province. The effect size calculated using eta squared, was .024 which is considered a large effect (Cohen, 1988). Therefore, 24 percent variability in performance is accounted for by province. The Games-Howell post hoc test resulted in six homogeneous groups as shown in Table 15.

Table 15: Games-Howell homogeneous groups for performance by province

	Province	N	Subset for alpha = 0.05					
			1	2	3	4	5	6
Games-Howell	Northern Cape	295	108767.36					
	Free State	75	145333.33	145333.33				
	Eastern Cape	125		229078.66	229078.66	229078.66		
	North West	130			229707.73	229707.73		
	KwaZulu-Natal	320			235470.07			
	Gauteng	225				311328.18	311328.18	
	Limpopo	160					387729.9 7	
	Western Cape	95						668299.2 8

The WC ($M = 668\,299.28$, $SD = 293\,157.49$) was significantly different from all the other provinces and it was the province with the highest mean performance. Mean performance for NC ($M = 108\,767.36$, $SD = 173\,636.29$) was the lowest. The major difference was between NC and WC. This is also supported by non-overlapping of the groups as shown in Figure 5.

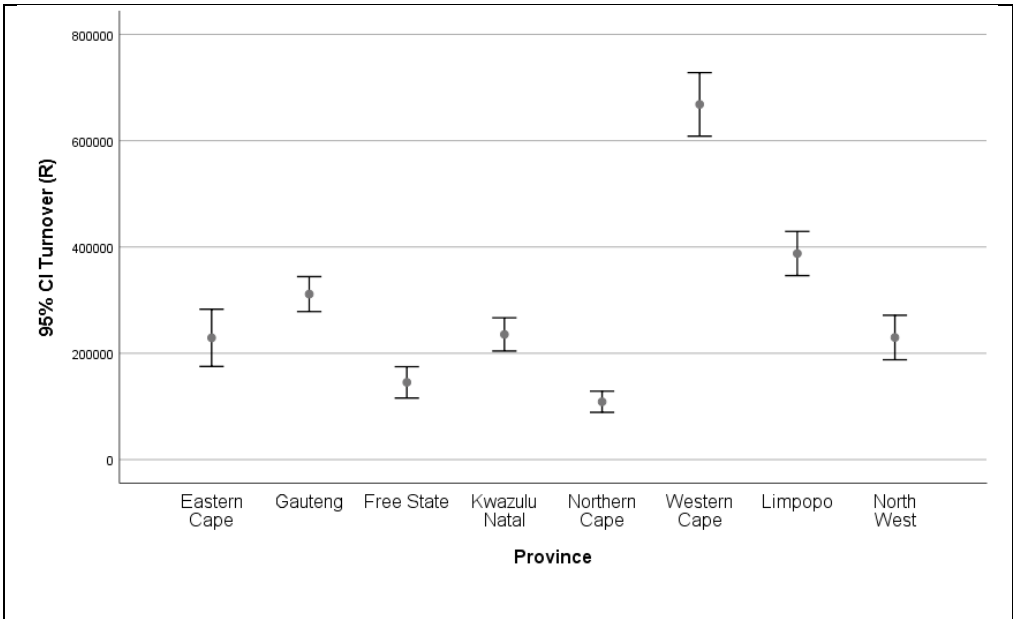


Figure 5: Confidence interval error bars for TURNOVER by province

The province with the lowest standard deviation is NC. It can be observed that the provinces with the highest mean performance are WC and Lim. Both the NC and WC provinces, in accordance with Stats SA classification, fall within the category of those with most urban dwellers. The results do not provide a clear picture if there is a difference in performance of co-ops in terms of rural or urban basis.

The one-way analysis of variance tests results for access to loan indicated a statistical significance difference ($F(2, 1422) = 55.883, p < .001$). Since the variances were not equal, the Welch robust tests for equality of means was performed and it gave the same p-value of less than .001 ($F(2, 166.203) = 51.059, p < .001$). Thus, the means were significantly different across categories of access to loans. The effect size, calculated using omega squared, was .07 which is considered of moderate effect (Cohen, 1988). Thus, 7 percent of the variability in performance is accounted for by access to loan. The Games-Howell post hoc test resulted in two homogeneous group as shown in Table 16.

Table 16: Games-Howell homogeneous groups for performance by access to loan

	Access to land	N	Subset for alpha = 0.05	
			1	2
Games Howell	Not specified	813	195403.93	
	Named	65	299108.06	299108.06
	None	547		354848.77

Post hoc comparisons using the Games-Howell test indicated that the mean performance for not specified ($M = 195403.93, SD = 227799.17$) was the lowest while the mean performance for none ($M = 354848.77, SD = 321451.52$) was the highest. The major difference was between not specified and none. The confidence interval error bars are shown in Figure 6.

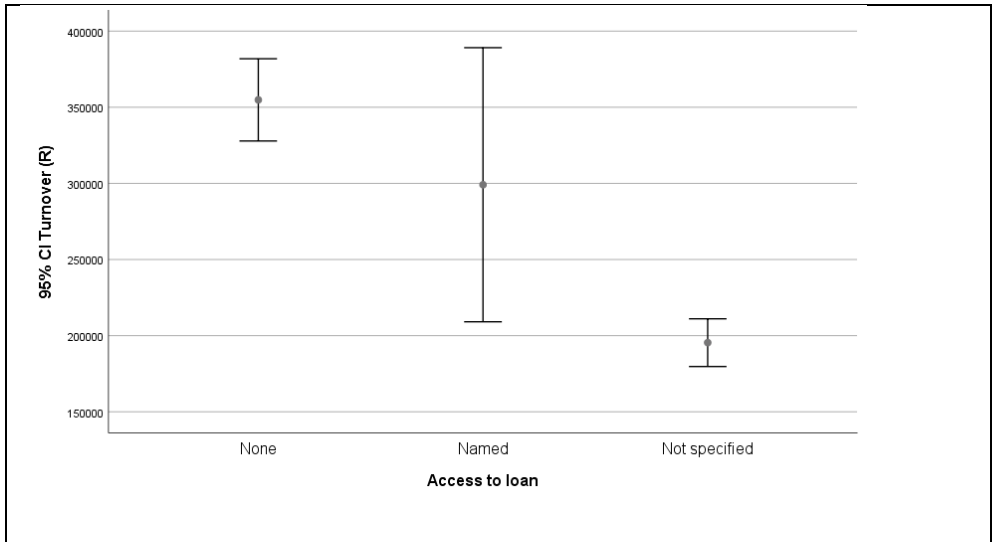


Figure 6: Confidence interval error bars for TURNOVER by access to loan

Those with loans had the highest variability as evidenced by the length of the error bar. Mean performance for those not specified was significantly different from those with none. Those without loans tend to have a higher turnover, that is, they seem to be performing better. Access to loans had a positive effect on performance of the co-op. Smallholder producers are constrained by a lack of access to finance such as loans and credit. It therefore stands to show that co-ops can potentially improve their performance when they have access to finance. This is in line with Fowowe (2017) who asserts that finance allows businesses to expand operations and impact positively on employment growth. There is no immediate explanation for the lowest performance shown by turnover of just over R200 000 in co-ops who did not specify access. Perhaps the lowest mean could be the result of constant underperformance due to co-ops not being able to meet member objectives as a result of financial constraints.

The ANOVA test results for access to land indicated no significant difference ($F(3, 1421) = 2.387, p = .067$). However, since the variances were not equal, the Welch robust tests for equality of means was performed and it gave a p-value of .035 ($F(3, 90.457) = 2.994, p = .035$). Therefore, the means were significantly different across categories of access to land. The effect size, calculated using omega squared, was .006 which is considered of small effect (Cohen, 1988). Thus, the .6 percent of the variability in performance is accounted for by access to land. The Games-Howell post hoc test resulted in two homogeneous group as shown in

Table 17: Games-Howell homogeneous groups for performance by access to land

	Access to land	N	Subset for alpha = 0.05

			1	2
Games	Communal/Tribal land	128	198022.50	
Howell	Bonded/Title deed	41	257409.76	257409.76
	Not specified	1219		267417.59
	Lease agreement	37	257409.76	257409.76

Post hoc comparisons using the Games-Howell test indicated that the mean performance for not specified ($M = 267417.59$, $SD = 289678.09$) was significantly higher than the mean performance for tribal or communal land ($M = 198022.50$, $SD = 247244.70$). The major difference was between these two groups. This is also supported by non-overlapping of the groups as shown in Figure 7.

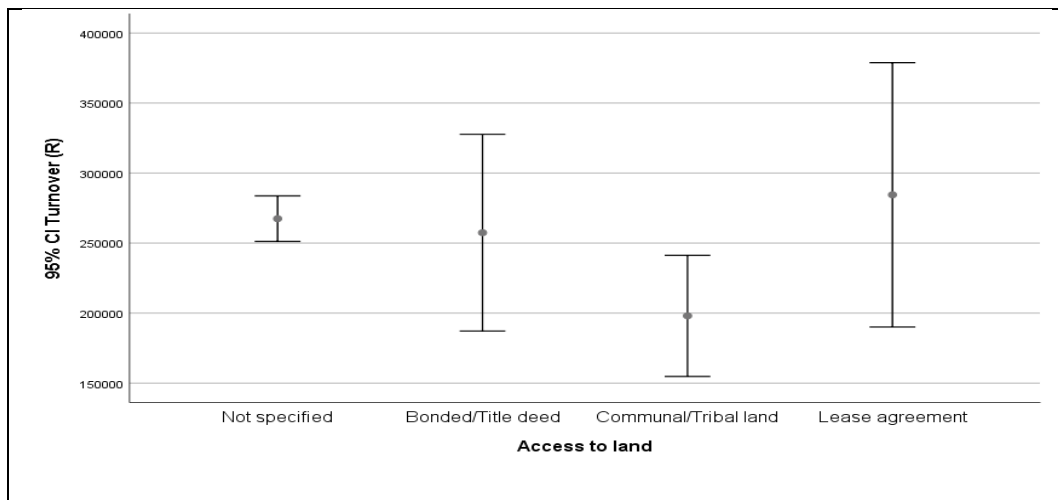


Figure 7: Confidence interval error bars for TURNOVER by access to land

Those with lease agreements had the highest variability as evidenced by a longer error bar. Co-ops on leased land also had a higher performance than the rest of the group, shown by the highest TURNOVER recorded between R30 000 and R400 000. Leases turn to provide producers with the flexibility to expand production, be it with cattle or crop, without having to incur the large capital costs and debt associated with the purchase of land.

Mean performance for not specified was significantly different from communal/tribal land. Those under communal land tend to perform the worst of all categories. The majority of the co-ops (85 percent) in the study did not specify the nature of tenure arrangements. Perhaps most of those who did not specify the nature of tenure arrangements form part of the beneficiaries of the land reform programme, where government purchased land on behalf of the farmers. However, there seems to be a decline in performance on land reform farms as indicated in a

study by Kirsten et al. (2009) who discovered a general downward trend of about 62 percent in performance of the land reform projects in the NW province.

The ANOVA test results on the performance resulted in no significant differences across manager's qualification ($F(3,801) = 2.053, p = .105$). However, since the variances were not equal, the Welch Robust tests of equality of means was used and a p-value of .062 ($F(3,151.034) = 2.500, p = .062$) was obtained, which showed that the means were not significantly different across manager's qualification. This is in line with Azadi et al. (2010); Karami and Rzaei-Moghaddam (2008) who do not find any significant impact of managerial educational qualifications on performance.

4.8 Summary and conclusions

This chapter provided descriptive results of the analysis of factors that determine performance of emerging agricultural co-ops in South Africa. Correlation analysis showed no evidence of correlation among the explanatory variables. The data were fitted to the three models to determine performance. Robust tests were conducted for all three models, due to presence of heteroscedasticity in the data. Four of the hypothesized variables came out with a significant relationship on turnover. The variables with significant impact on TURNOVER were membership (MEMB), wages (WAGES), training (TRAINING) and number of years in operation (OPER). Membership and training had a negative effect, while wages and number of years in operation had a positive effect.

CHAPTER 5. DISCUSSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

5.1 Introduction

This section discusses the key findings obtained in Chapter 4 on the analysis of the factors that determine success of emerging agricultural co-ops in South Africa. The study associates performance of an agricultural co-op with the co-op's continued ability to achieve the objectives as set by the members. In the case of this study, turnover is regarded as a measure for performance.

5.2 Overview of the key factors that determine performance

Agricultural co-ops offer an efficient and effective means for government to provide intervention measures to a large grouping of farmers as opposed to targeting individual farmers. In assessing the factors that determine performance of emerging agricultural co-ops, conclusions reached from the descriptive results in Chapter 4 indicate that factors that had a significant impact on performance are membership, training, wages and the number of years in operation.

5.2.1 Membership

The study finds that a large membership impacts negatively on the performance of an emerging agricultural co-op, in contradiction to our expectations and also rejecting the findings by Bazasnak (2008), Adefila (2012), and Martens and Lucato (2017); who find a positive relationship between a large group and performance of a co-op. Ideally, a large membership has to contribute towards lowering costs per unit due to shared resources among the farmers. This may be the reason behind the positive relationship between performance and a large membership. In South Africa, most of the production occurs in the rural centres and the produce is transported mostly by road to the urban centres where the main markets are located. It is a common occurrence for the smallholder producers in a co-op to use common transport to the markets. Bazasnak (2008), however, credits the positive relation of a large group to a strong manager, rather than the group itself, thus indicating that the large group itself does not entirely explain performance of a co-op in the absence of the manager who plays a central role in the coordination of group activities and ensures access to markets at best prices.

The findings, however, corroborate with Karami and Rezaei-Moghaddam (2005), and Mubirigi, Shukla and Mbeche (2016) who found a negative relationship between co-op membership size

and performance. A multitude of factors can explain the results, among those being the financial incentives provided by government to start up co-ops in an effort to drive participatory development in rural areas. South Africa is characterized by high unemployment levels. The incentives by government might have unintended consequences of attracting individuals with no particular interest in farming, but driven by unemployment to gain access to government resources. This in turn breeds conditions conducive to free-riding and rent-seeking behaviour, hence the negative performance of co-ops and subsequent high failure rate.

5.2.2 Training

The results of the study showed a significant negative association between training and performance of a co-op. This contradicted our expectation as well as the findings by Mubirigi et al. (2016), but corroborated the findings of Khan et al. (2016). Investment in human capital through learning and training outside of the school environment is always linked to newly acquired skills and improved productivity as noted by Krasniqi and Topxhiu (2016). The strong negative impact of training on performance of the co-op can explain uncoordinated efforts from government through the various departments that provide support to train the co-ops in the agricultural sector. Largely, the training is never accompanied by resources to ensure replication and adoption. It is known that smallholder farmers have poor access to credit and lack resources, including production inputs such as fertilizers and seeds. Without access to resources, the acquired knowledge cannot be implemented (Mubigiri et al. 2016).

5.2.3 Number of years in operation

The number of years that the co-op has been in operation (OPER) show a significantly positive effect with performance of a co-op in line with our expectations. The results also corroborate the findings by Mubigiri et al. (2016), Adefila (2012) and Bond (2009). Adefila (2012) equates the number of years in business to experience, which in turn contributes to performance. The results contradict the findings by Azadi et al. (2010) who found no significant correlation between performance and the number of years in operation. According to Azadi et al. (2010:94), success does not equate to sustained results, but to “short-term, tactical or temporal achievement”. However, in line with this study, Khan et al. (2015) associate performance of a co-op with its ability to sustain itself over an extended period of time. This is in line with this study whereby the sample was selected based on the number of years that the co-op was in business. The initial three years of the business are the most critical. Usually, most of the start-

up businesses fail during this period; time offers an opportunity to learn by doing and also for mistakes to be corrected.

5.2.4 Wages

Wages are not widely used in imperial to determine performance of a co-op. The researcher included the variable as generated by the CODA system. The results indicate a significantly positive relation with performance. Workers receive wages in exchange of their labour in a firm. Businesses that have a high number of workers turn to have high levels of wages as opposed to the businesses with a lower number of employees. This finding is in line with the expectations of the study, where the expectation was for co-ops that generate high levels of revenue to have high levels of wages. The finding confirms the potential role that co-ops can play in income distribution in the rural areas as well as in absorbing excess unemployment and thus contribute to development. At the same time the findings reject a study by Bell and Van Reenen (2012), who find a weak correlation between firm success and wages.

5.3 Summary and conclusions

This research concludes that membership, wages, years in operation and training play a significant role in explaining revenue and thus performance of an emerging agricultural co-op. However, there may be other underlying factors not explored by the study such as technological innovation, the tax burden, natural factors such as rainfall and market incentives which may impact on performance of emerging agricultural co-ops. Some of the inconclusive findings in the study may be due to the sample selection biases which looked at co-ops with at least five years of business experience by 2017, from 2013. The presence of primary data could have allowed expansion of the study by doing propensity score matching to establish the effect of regressors in determining the effects on returns of the co-ops and broadly on province bases.

5.4 Policy implications and recommendations

Co-ops should be allowed to mushroom organically at grassroots level, based on identified problems commonly shared among the co-operators. It will allow members to have a strong sense of identity with the co-op and most probably be willing to voluntarily contribute financially towards the operations of the co-op. As a result, government involvement should be to ensure provision of an environment conducive for co-ops to thrive. The possibility of ensuring that the financial and other resources advanced to the businesses are repaid to replenish the fund in such a way that it is able to assist the new entrants should be considered. In essence,

government and funding institutions should implement funding programmes that give co-ops access to credit.

On an ongoing basis, training should be provided to co-operators starting the process before the registration to ensure that participants understand the legal entity they are due to embark on. Training should further be targeted and specific to the activities of individual co-ops, with DAFF as the lead department in the sector being at the centre of all efforts geared towards interventions aimed at emerging agricultural co-ops. It will be wasteful if the training provided is not in line with what the co-op does. Providing tractor maintenance training to co-operators who do not own a tractor can prove futile as the skill may not be implemented after the training. It is therefore essential that co-operators are equipped with basic resources to allow them to put the training into practice. This serves as a basis for the partnerships between business and government in the implementation of the Sector Transformation Codes to ensure increased participation in the sector.

5.5 Future research

Due to limitation of information, the researcher considered turnover as the only dependent variable to assess performance of an emerging agricultural co-op. Co-ops pursue multiple objectives, without necessarily looking at maximizing profits. Further research opportunities should consider enriching this study on the assessment of factors that determine performance of emerging agricultural co-ops by exploring other dependent variables which include an increase in the size of membership, degree of trust among the members and knowledge of cooperative principles by the members.

The study also found an insignificant, but negative, relation between performance of an emerging agricultural co-op and grant funding. The study can further be enriched by exploring this negative relation to inform policy in the support of emerging agricultural co-ops who turn to be dependent on government support for equity capital, infrastructure development and a host of other requirements.

The researcher further suggests further studies that will establish the role of entrepreneurship and technology on performance of emerging agricultural co-ops.

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APPENDICES

Appendix 1: Summary of the selected variables and their impact on performance of agricultural cooperatives

Author(s) year and region	Nature of data and time span	Regressand	Regressor(s)	Estimation technique	Main Findings
Martins, F.S. and Lucato, W.C. (2017) Brazil	Panel	Net sales billed (NSB), Return on sales (ROS), Return on capital employed (ROCE), Current liquidity ratio (LIQ) The debt ratio (END)	Horizontal diversification Lateral diversification Vertical diversification Operating area Number of associates Operating time (no. of years of operation) Size	Correlation Analysis Shapiro-Wilk test	<ul style="list-style-type: none"> • + • - • - • + • + • +
Amene, T. B. (2017) Ethiopia	Cross sectional 2015	Growth in sales Marketing cost reduction Bargaining power Carrying for others	Members Value Factors Co-op governance factors Infrastructural factors Marketing factors Finance factors	Correlation analysis Exploratory Confirmatory factor analysis	<ul style="list-style-type: none"> • + • + • + • + • +
Mubigiri, A. (2016) Rwanda	Cross sectional	Cooperative economic growth	Cooperative structure: managerial skills	Correlation and Regression techniques	<ul style="list-style-type: none"> • + • +

Author(s) year and region	Nature of data and time span	Regressand	Regressor(s)	Estimation technique	Main Findings
	(date not specified)		training and skills Government support factors: Subsidies		• -
Khan, H. H. A., Yaacob, M. A., Abdullah, H. and Ah, S. H. A. B. (2016) Malaysia	Cross sectional 2011	Profit growth, Sales growth, ROA Return on sales	Structural capital Relational Capital Human capital	Correlation analysis Multiple regression analysis	• + • + • -
Khan, H. H. A., Yaacob, M. A., Abdullah, H. and Ah, S. H. A. B. (2016) Malaysia	Cross sectional 2011	Profit growth, Sales growth, ROA Return on sales	Structural capital Relational Capital Human capital	Correlation analysis Multiple regression analysis	• + • + • -
Dejene, E. and Getachew, D. (2015) Ethiopia	Cross sectional 2013	Service offering	Member Commitment Member Participation Structural factors (no. of workers in a co-op) Communication Managerial factor (education) External factors	Simple statistical tools: Percentage s, mean and standard deviation	• + • + • + • + • + • +
Adefila, J.O. (2012)	Cross sectional 2011	Role performance of the farmers'	Income	Multiple regression	• + • +

Author(s) year and region	Nature of data and time span	Regressand	Regressor(s)	Estimation technique	Main Findings
Nigeria		cooperative organizations	Number of years farming Number of people enrolled Assessment of leadership		<ul style="list-style-type: none"> • + • +
Azadi, H., Hosseininia, G., Zarafshani, K. Heydari, A. and Witlox, F. (2010) Iran	Cross sectional 2006	Income maximisation Maximum participation Equity maximisation	Individual factors: manager education Economic factors Structural factors: number of members in a co-op, years in operation	ANOVA Spearman correlation Pearson correlation	<ul style="list-style-type: none"> • + but no significant association • + but not significant • + but not significant
Banaszak, I. (2008) Poland	Cross sectional 2005	Benefits/costs Price Premium	Number of group members Leadership strength Communication among members Member homogeneity	Stepwise ordinal probit regression ANOVA	<ul style="list-style-type: none"> • + •
Karami, E. and Rezaei-Moghaddam, K. (2005) Iran	Cross sectional	Total performance index (TPI)	Government support factors: loan Co-op structure factors: Manager education Membership size Age of co-op	Hierarchical regression analysis	<ul style="list-style-type: none"> • + • + (weak) • - • -