


**Performance Evaluation of Agricultural Cooperatives in Mpumalanga
Province, South Africa**

Sharon Thembi Xaba

Promoters:

DR. NYANKOMO MARWA (USB)
DR. BABITA MATHUR-HELM (USB)

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Declaration

By submitting this research proposal I, Sharon Thembi Xaba, declare that the entirety of the work contained therein is my own, original work, that I am the owner of the copyright thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

Sharon Thembi Xaba

March 2020

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For the time I have spent working on this project, I needed to remain focused and re-ignite my drive and the value this study will have. For that I thank my Mom, Deliwe Xaba, for the resilience and patient attributes I have learnt from her: now that she has departed, I will carry on, always pushing for excellence to make her proud. My family, as my foundation, for their support as I needed to find balance and support with raising my son whilst pursuing my studies. My son Uminathi, you are my compass, every time I looked at you, I had to realign my direction and definitely 'failure was not an option'.

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Last but not least, my friends who have continued to support, and cheer me up when I was getting off the road, they reminded me that I was closer to the finish line.

I sign off by inspiring those that are yet to take a challenging journey, with my favourite quote from one the greatest leaders of our lifetime, late Former President, Mr. Nelson Mandela: "*it always seems impossible until it's done*".

Abstract

The role of cooperatives and agricultural cooperatives in an economy is widely recognised as being a catalyst for inclusive growth and development. Despite the role played by cooperatives, their performance in Africa and South Africa, in particular, has been contentious, based on anecdotal evidence. In South Africa literature points out that post the enactment of the Cooperative Act 14 of 2005, the registration rate of cooperatives went up from less than 250 to more than 50,000 cooperatives between 2005 to 2012. However, the mortality rate was at 88% post registration and there was also a decline in revenue from 2005 to 2012. Reasons for the failure to sustain has to be empirically investigated. The current dearth of empirical literature in this domain implies that policy makers and decision makers are constrained on evidence-based knowledge to inform their decision. As a modest effort towards bridging this knowledge gap, the study focuses on performance evaluation of agricultural cooperatives in Mpumalanga province. Performance evaluation is important for firms or organisations to diagnose underlying problems, and assists them in allocating resources efficiently. Performance evaluation also allows the optimisation of profit through rational input allocation to achieve the desired or maximum outputs and informs the firm on sustainability drivers.

The study used a mixed methods approach to analyse the efficiency, profitability and sustainability of agricultural cooperatives and stakeholder perception of the drivers of performance. The study extends the traditional performance evaluation literature by making use of methodological triangulation.

The study incorporates three essays to measure performance. The first essay focused on efficiency evaluation. A total of 19 agricultural cooperatives/ decision making units (DMUs) were analysed and technical efficiency measured, using secondary data from audited financial statements in the financial year 2015/16. Data Envelopment Analysis was employed. The average technical efficiency was found to be 72%, indicating the presence of 28% resource wastages. Of the 19 DMUs, only five (26%) were 100% efficient. It should be noted that the 26% that were technically efficient were also operating at constant returns to scale (optimal resource allocation). The findings signal that size or scale of the cooperative has an impact on efficiency levels. Government and related cooperative stakeholders should consider aligning support based on the scale at which cooperatives are operating, as opposed to one-size-fits-all support.

The second essay examined profitability ratios, extending the analysis to an efficiency profitability matrix to measure if efficient firms were equally profitable. Return on Assets (ROA) was used as a measure, and the median score for profitability for the 19 cooperatives was 10%. Using the technical efficiency/profitability benchmark, the study employed the efficiency/profitability matrix, which separated best performers from low performers. The matrix indicated that 26% of the cooperatives had high efficiency levels with high profitability (stars). The majority of the DMUs at 42% (8 out of 19) were in quadrant 3, categorised as 'question mark', with low efficiency scores and low profitability ratios. Results indicate that efficiency and profitability are not always positively correlated, managers should understand a cooperative as a business as well as its social role towards economic development.

The third essay applied methodological triangulation, where qualitative analysis was employed. Stakeholder views were gathered on the performance of cooperatives, and what should inform the future of the cooperatives for sustainability. Ten agricultural cooperatives were selected, where five were high performers and five were low performers, the justification for this selection was that choosing the extremes tends to provide contrasts: there seem to be shared characteristics relating to their performance or non-performance. What stood out as drivers for performance were access to funding, access to markets, members' commitment, governance and leadership, while performance inhibitors were lack of access to finance, members' conflict, low skills levels, and poor governance. What also came out was that there was a 'policy–reality gap' (from policy and implementation).

The overall results across all performance measurement proxies indicated that agricultural cooperatives are not performing at optimal levels, with results indicating that they are not efficient in resource allocation, with a majority showing that they are both technically inefficient and not profitable. The performance or non-performance has been driven by agricultural cooperative members.

With the above, there are a number of policy implications. With regard to efficiency, size of the cooperative matters, classification on scale should be considered. With regard to profitability, policy decisions should factor in empowering the agricultural cooperatives as firms, for them to be able to manage resources efficiently while at the same time being profitable, resulting in sustainable organisations. Policy makers should also note that there is always a gap between policy and implementation, there is therefore a need to strengthen their knowledge base on the ground, as opposed to designing policies from a

hypothetical point of view. There is a need for government to reconsider support and link it with risk-sharing mechanisms. Measures to protect government investment should be applied, and risk-sharing mechanisms should be considered. This will ensure that cooperative members guard against business failure, so that they manage cooperatives as profitable businesses and achieve their intended objective of job creation and contribute towards economic development.

The results of the study contribute to empirical findings linked to the performance of cooperatives. As the mixed method approach was used, the study's contribution is from both the methodological approach and also policy influence, as the results will inform future policy development and cooperative support. The findings also provide a platform for future studies on performance of cooperatives.

Dedication

I dedicate this final product to my late Mom, Deliwe Lina Xaba, she receives the highest order in my dedication, my heart still beats for our reunion. My finishing the PhD journey will never be the same without you cheering me up. To my late dad, Dani Ben Xaba. he saw the future in schooling me. I know my departed parents, you are always looking over me. Till we meet again.

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List of Acronyms and Abbreviations

AFS	Annual Financial Statements
BCC	Banker, Charnes and Cooper
BRICS	Brazil, Russia, India, China and South Africa
CCR	Charnes, Cooper and Rhodes
CRDP	Comprehensive Rural Development Strategy
COPAC	Cooperative and Policy Alternative Centre
CRS	Constant Return to Scale
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Data Envelopment Analysis
DFI	Development Finance Institution
DMU	Decision-Making Unit
DRS	Decreasing Returns to Scale
DSBD	Department of Small Business Development
DTI	Department of Trade and Industry
FAO	Food and Agricultural Organisation
FSS	Financial Self-sustainability
ICA	International Cooperative Alliance
ILO	International Labour Organisation
IOFs	Investor Owned Firms
IRS	Increasing Returns to Scale
MEGDP	Mpumalanga Economic Growth and Development Path
MFI	Microfinance Institution
NCASA	National Co-operative of Association of South Africa
NIE	New Institutional Economics
OSS	Operationally Self Sufficiency
PTE	Pure Technical Efficiency
RDP	Reconstruction and Development Programme
ROA	Return on Assets
ROE	Return on Equity
SE	Scale Efficiency
SFA	Stochastic Frontier Analysis
SMME	Small Medium Micro Enterprise
TA	Thematic Analysis

TE	Technical Efficiency
UN	United Nations
VRS	Variable Returns to Scale

CHAPTER 1

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION

The role of cooperatives in an economy is widely recognised, ranging from fostering inclusive growth to enabling the marginalised to take significant negotiating positions in markets (Helmberger & Hoos, 1962; Ortmann & King, 2007b; FAO, 2012¹; DAFF, 2012). Cooperatives have unique characteristics of reducing poverty, improving food security and generating employment opportunities, and enjoy flexibility in meeting a wide variety of social and economic human needs (DTI, 2012). Cooperatives are not confined to any specific sector, they can be financial, agricultural, health care, housing, among many other types (Kumar, Wankhede & Gena, 2015).

Due to their unique role in economic development, cooperatives continue to receive global attention. In the year 2011, BRICS countries² signed a Memorandum of Understanding to facilitate trade and investment promotion for cooperatives within the BRICS countries. The UN declared the year 2012 as the year of cooperatives, encouraging members to support cooperatives: this was in recognition of the role cooperatives play in social and economic upliftment of communities, agricultural cooperatives in particular (Derr, 2013).

Agricultural cooperatives are therefore crucial in the economy, and they play a catalyst role towards growth and development in developing countries, by accelerating agricultural development and inclusive growth (Machete, 1990). In recognition of such significance, governments across the world have come up with various strategies to mobilise establishment of co-operatives, support their operations and ensure a conducive environment including through the creation of legislative frameworks (Ortmann & King, 2007a).

1.2 BACKGROUND

As alluded to in the introduction, agricultural cooperatives play a pivotal role in the economy, and different countries have their respective laws and regulations to stimulate the growth and support of cooperatives. For example, Cambodia has the Bylaws of Agricultural Cooperatives, Japan has the Agricultural Cooperative Law, and in South

¹ <http://www.fao.org/docrep/016/ap431e/ap431e.pdf>.

Africa, the agricultural cooperatives are regulated under the Cooperative Act (No. 14 of 2005). The Cooperative Act in South Africa recognises the cooperative values of self-help, self-reliance, self-responsibility, democracy, equality and social responsibility. It was hailed as effective vehicle for integrating smallholder farmers and other sub-groups from the previous disadvantaged population in the economy (DTI, 2012).

Based on the role and significance that agricultural cooperatives hold in the economy, performance evaluation becomes important in order to sustain agricultural cooperatives as organisations that can integrate the communities into the mainstream economy (Ruben & Heras, 2012). Performance evaluation enables the firm or organisation to diagnose underlying problems. Performance measurement and benchmarking offer insights to the management of the firm on to how to allocate resources or to be efficient, and how to optimise profit through rational input allocation to achieve the desired or maximum outputs (Cook, 1994). Efficiency also strengthens the firm's capacity to face changing marketing conditions, increasing input cost and economic hardships (Guesmi, 2013).

Studies have indicated that agricultural performance has varied both globally and within South Africa. Some studies have demonstrated successful cooperative performance: success stories have been recorded in Quebec, where the survival rate of cooperatives is 24% higher than any other form of business (Doyon, 2002). Other countries which have recorded success stories on cooperatives are Finland (Syrjä, Sjögrén & Tuominen, 2012), Korea (Yoo, Buccola & Gopinath, 2013) and Tanzania (Marwa, 2015). Success in these economies has been attributed to good governance, institutional characteristics such as efficiency, capital structure and size among others (Yoo et. al., 2013; Amersdorffer, Buchenrieder, Bokusheva & Wolz, 2015).

On the other hand, success has not yet been widely witnessed in countries such as Portugal, where agricultural cooperatives (except milk-based) have been losing market share (Cabo & Rebelo, 2005), and Spain, where López and Marcuello (2006) noted that even though other performance indicators of cooperatives are doing well, the efficiency is worrisome. A study by Ito, Bao and Su (2012) noted an increase in the number of cooperatives in China, however the membership has recorded a decline, attributable to the management of the cooperatives (Ito et al., 2012). A study done by Mude in Kenya found that weakness in the institutional organisation resulted in the dismal performance of Kenya's coffee's cooperatives (Mude, 2006).

² Brazil, Russia, India, China and South Africa.

Nilsson, Svendsen and Svendsen support Mude in that most agricultural cooperatives have failed, arguing that in the past 20 years most cooperatives were forced to abandon their business form and attributing this to members having little trust in the cooperatives as a business (Nilsson et al., 2012). The same arguments are held by Li (2010) who recorded falling competitive advantage due to inefficiencies among cooperatives in China (Li, 2010). In Greece Sergaki and Semos (2006) noted that cooperatives were struggling due to inefficiencies. In a similar context, 80% of Thailand's cooperatives were found to be inefficient (Pongpanich & Peng, 2016), with Yoo et al. (2013) noting that size matters, with small cooperatives being more inefficient (Yoo et al., 2013).

The 'size' of the cooperatives in South Africa is however limited to annual turnover, in line with SMME revenue (DTI, 2012), not in a strict sense of number of employees. For turnover less than R3 million and 50 employees the business is considered to be a small enterprise and R5 million, 100 employees as medium enterprise. Cooperatives in South Africa are classified under SMMEs (Ortmann & King, 2007b; DTI, 2012).

The South African government has acknowledged that co-operatives have potential benefits over other types of enterprises, however the economy is yet to realise such (DTI, 2012). According to DAFF, in the year 2015, there were 2,682 agricultural cooperatives registered with DAFF (2015).

Table 1.1 indicates the number of registered agricultural cooperatives per province and the performance on the annual turnover over a period of three years (financial years 2012-2016³).

Table 1.1: Number of agricultural cooperatives and annual turnover by province (2012-2015)

Province	Number of cooperatives	Financial year in R000			
		2012/13	2013/14	2014/15	2015/16
Eastern Cape	267	16,037	3,712	20	2,121
Free State	150	2,616	1,456	5,118	4,970
Gauteng	148	2,100	9,112	810	3,760
KwaZulu-Natal	594	2,459	15,485	24,589	26,957
Limpopo	479	6,718	10,098	22,421	26,580
Mpumalanga	571	6,200	19,711	698	4,814
Northern Cape	120	1,460	564	4,881	4,951
North West	222	3,740	3,124	4,516	4,516

³ The Government's financial year runs from 1st April to 31st March.

Western Cape	131	100	43,210	74,302	43,341
	2,682	R63,560	R134,594	R157,679	R117,196

Source: DAFF (2015)

The figures indicate that KwaZulu-Natal had the highest registration at 22% followed by Mpumalanga at 21%, with the Northern Cape the lowest at 4%. Despite the high number of registrations, DAFF's report on the performance of cooperatives indicated a decline in revenue from R157 million in the year 2014/15 to R117 million in the year 2015/16 (DAFF, 2015). The DTI report indicated a mortality rate of 88% of cooperatives post registration (DTI, 2012) and Derr argued that the rate of active business after registration is less than 50% (Derr, 2013).

Literature is not certain of the causes of the high mortality rates of 88%, and the decline in revenue in some provinces, with some attributing it to inefficiencies, lack of management skills, in-fighting, inability of members to dismiss inefficient management, and lack of strategy (Machete, 1990; Österberg & Nilsson, 2009). Others consider the lack of procurement preference (Machete, 1990; Janda & Seshadri, 2001), and the DTI attributing it to the fact that dedicated agencies designed primarily to support co-operatives on a focused basis resulted in untargeted and unco-ordinated support, characterised by poor mentorship and minimum investment (DTI, 2012).

With the above literature, it is evident that the findings on the performance of agricultural cooperatives have not yielded similar results, some citing complete failure (Mude, 2006; Nilsson et al., 2012; Chibanda et al., 2009) while other studies have demonstrated that agricultural cooperatives have been efficient and achieved successful integration into the economy (Stattman & Mol, 2013; Prakash, 2000). Given, the mixed evidence and that not all of them are failing, what are the drivers of performance? and for those that are performing, are they efficient and sustainable? These questions need systematic inquiry, which this study attempts to provide.

Given the above review, it is therefore imperative to revisit the question in the South African context. This study will focus on Mpumalanga Province. Mpumalanga has been purposely selected because the provincial government had a keen interest in the performance of the industry and solicited the research through internal capacity building for sustainable in-house performance evaluation. Given the fact that the government in Mpumalanga has continued to support the development and funding of cooperatives, a better understanding of the performance and the determinant of performance in the sector

and in Mpumalanga could help to diagnose the problem areas and offer insights for effective planning and policy decisions. This research will therefore contribute to academic studies and future policy development.

1.3 PROBLEM STATEMENT AND SIGNIFICANCE OF RESEARCH

Agricultural cooperatives in South Africa were formed as entities to accelerate transformation and integrate emerging farmers into the mainstream economy. The DTI emphasised the high level objective of government towards cooperatives: “to promote co-operatives as a vehicle to assist in creating decent employment and reducing poverty through income-generating activities” (DTI, 2012). However recent studies signal failure in the performance of agricultural cooperatives (Mude, 2006; Nilsson et al., 2012; Chibanda et al., 2009).

The study by Derr (2013) argued that the rate of active business after registration is less than 50% in South Africa: this implies that cooperatives in South Africa continue to perform on a downward trajectory. The high failure rate (88%) indicated by DTI elevates the high mortality rate of cooperatives. The DAFF report on the performance of agricultural cooperatives indicated a decline in revenue generation of agricultural cooperatives in the financial year 2015/16.

It is argued that such challenges faced by cooperatives hinge on inefficiencies related to lack of strategy and poor management (Machete, 1990; Österberg & Nilsson, 2009) while those succeeding are able to efficiently utilise their resources (Sergaki & Semos, 2006). This poor performance is emphasised by Machete (1990) who pointed out that inefficient management led to a high rate of failure, and poor management and lack of strategy resulted in poor performing cooperatives.

In addition to the hypotheses of the relationship between cooperative success and efficiency, the existing mixed results from empirical literature on performance evaluation imply that the cooperatives' performance varies by local conditions. Such concerns call for a systematic empirical study to investigate the performance of agricultural cooperatives in South Africa, and in Mpumalanga in particular. Specifically the questions about the level of profitability, efficiency and financial sustainability calls for a systematic answer to guide evidence-based decision-making in the industry. This study is expected to contribute towards generating empirical knowledge towards the scanty literature in this domain. Such

knowledge could offer insights to inform policy and practice on the effective management of agricultural co-operatives.

1.4 RESEARCH QUESTIONS AND RESEARCH OBJECTIVES

This study seeks to empirically investigate and analyse the performance of the agricultural cooperatives in Mpumalanga through probing the following research questions:

1.4.1 Research questions

- i) What is the level of (in)efficiency of agricultural cooperatives in Mpumalanga and their correlates?
- ii) Are agricultural cooperatives financially sustainable? What explains the variation of their sustainability?
- iii) What is the stakeholder perception of the performance of agricultural cooperatives and the causes of performance variation among agricultural cooperatives?

1.4.2 Research objectives

In response to the research questions, the following are the research objectives:

- i) To measure and analyse technical efficiency of agricultural cooperatives and determine the drivers of efficiency among agricultural cooperatives in Mpumalanga.
- ii) To analyse profitability, financial sustainability and their determinants among the agricultural cooperatives.
- iii) To investigate stakeholders' perceptions of the agricultural cooperatives' performance and its challenges.

1.5 METHODOLOGY

The study applied mixed methods approach to analyse efficiency, profitability and sustainability of agricultural cooperatives. The first two objectives on efficiency and profitability were conducted through a quantitative analysis and measuring sustainability was done through a qualitative analysis. A methodological triangulation was therefore employed to measure efficiency, profitability and sustainability.

Secondary data was sourced from the Mpumalanga Department of Agriculture, for cooperatives that had reported on their Annual Financial Statements (AFS) for the financial year 2015/16. Nineteen agricultural cooperatives were selected from those that

complied with AFS reporting. The selection was based purely on compliance, across the districts of Mpumalanga province, namely Nkangala district, Gert Sibande district, Ehlanzeni South and Ehlanzeni North districts.

The first study objective of measuring technical efficiency, Data Envelopment Analysis (DEA) was employed to measure technical efficiency of the 19 agricultural cooperatives. Input variables are assets and expenditure, output variables being revenue and profit. The reason for selecting the four variables was informed by the variables being reported on across all AFS.

The second study objective is on measuring profitability, Return on Assets (ROA) was employed on the same 19 agricultural cooperatives to measure profitability ratios. Further to that the study extended the analysis to an efficiency/ profitability matrix, to test if efficient firms were equally profitable. The matrix analysed performance levels in four quadrants and provided opportunity for firms as to which areas to improve on for sustainability.

The third study objective measured sustainability and was conducted through stakeholder reviews, where cooperative managers, policy makers, regulators and academics were interviewed to source their views and also inform the future (sustainability) of the agricultural cooperatives. Ten agricultural cooperatives were selected, five being the best performers, and five being the worst performers: justification for choosing the 'extremes' is that there are always common and shared characteristics amongst performers and non-performers.

The validity of the responses was strengthened by having a similar approach when interviewing respondents, with no variation in the approach and questions for respondents. The 'factual' were decoded in terms of emerging themes as will be described in Chapter 6.

The methodology for each objective is presented in detail under the respective papers which form the chapters of the full thesis.

1.6 MAIN CONTRIBUTION OF THE STUDY

The study investigated performance evaluation of agricultural cooperatives in Mpumalanga. The study was initiated as a result of a gap in empirical findings on the performance of agricultural cooperatives, as cooperatives continue to receive government support. The study (methodology) further extended the analysis, to stakeholder reviews. To the best of the researcher's knowledge, no similar study has been done in

Mpumalanga. The study contribution will be a comprehensive assessment with empirical evidence for agricultural cooperatives in Mpumalanga. The results have policy implications, which will inform future policy decisions and effective cooperative programme management.

With the mixed method approach of applying DEA, efficiency/ profitability matrix, and a case study, the study has contributed to a methodological approach that could be further taken on future cooperative studies.

1.7 STUDY LIMITATIONS

As the study will be focusing on Mpumalanga, there is a limitation in that the findings may not apply in other provinces or may not have similar results when evaluating the performance of agricultural cooperatives in other provinces. From the financial data analysis, there is a limitation that the focus and data analysis will be limited to the financial years 2015 to 2016, which may omit some of the agricultural cooperatives which are efficient and sustainable outside the selected years. With regard to stakeholder perceptions, the study interviews are with agricultural cooperative managers and not with all members, which may lead to collecting bias information or responses. From the methodological approach, there are limitations pointed out in the DEA analysis: endogeneity, and not accounting for statistical noise, however these are dealt with in Chapter 3.

1.8 STRUCTURE OF THE THESIS

The study is divided into seven chapters.

Chapter 1 is the introduction of the study and presents the background of the agricultural cooperatives, research problem statement and the objectives of the study, including the study limitations.

Chapter 2 deals with the landscape and legislative development of cooperatives in South Africa: this chapter focuses on the historical context and legislative framework for cooperatives in South Africa.

Chapter 3 provides the theoretical framework and literature review of studies that empirically investigated overall performance evaluations of agricultural cooperatives, and empirical findings on geographical concentration are discussed.

Chapter 4 focuses on efficiency, and forms the essay on efficiency as a publishable paper, and describes the drivers of efficiency. Agricultural cooperatives are then measured in terms of efficiency (technical efficiency). This paper has since been published by African Journal of Economic and Management Studies (Xaba, Marwa & Mathur- Helm, 2019)

Chapter 5 is on profitability and is the essay, which extended the scope to an efficiency and profitability matrix, to establish if efficient cooperatives were equally profitable. This paper has since been published (Xaba, Marwa, Mathur-Helm, 2018).

Chapter 6 is on sustainability, and the analysis is premised on stakeholder perception, which integrates the findings under the quantitative findings of Chapters 4 and 5, with the qualitative analysis as a triangulation method. This chapter is also presented in essay format and will be considered for publishing post revision to be submitted by 29th February 2020 (Agrekon - Decision on Manuscript ID RAGR-2019-0055).

Chapter 7 is the conclusion: it provides a summary of the findings of the study and future recommendations informed by the full study.

With the above sequence of chapters, there will be an overlap and some level of repetitions on the introductions and methodology in Chapters 4 to 6, as the essays were presented separately for publication. In this regard, the background and the methodology was adopted from the bigger study in all three papers, and literature review in the essays will be found to be have been discussed in detail in Chapter 3.

1.9 ETHICAL CONSIDERATIONS

As the study is adopting a qualitative approach, beneficiaries were interviewed to source their views. Permission to interview the respondents was recognised and their rights to participate and withdraw were explained to them. The research proposal and questionnaire went through Departmental Ethics Screening Committee (DESC) for ethical clearance and was approved (date of approval, 8th December 2017).

1.9 REFERENCES

- Amersdorffer, F., Buchenrieder, G., Bokusheva, R. & Wolz, A. (2015). Efficiency in microfinance: financial and social performance of agricultural credit cooperatives in Bulgaria. *Journal of the Operational Research Society*, 66(1), 57-65.
- Cabo, P. & Rebelo, J. (2005). Why do agricultural cooperatives merge? The Portuguese experience. *Annals of Public and Cooperative Economics*, 76(3), 491-516.
- Chibanda, M., Ortmann, G.F. & Lyne, M.C. (2009). Institutional and governance factors influencing the performance of selected smallholder agricultural cooperatives in KwaZulu-Natal. *Agrekon*, 48(3), 293-315.
- Cook, M.L. (1994). The role of management behavior in agricultural cooperatives *Journal of Agricultural Cooperatives*, 9, 42-58.
- Department of Agriculture, Forestry and Fisheries (DAFF). (2012). *A report on the Agricultural Cooperatives Indaba*. Pretoria: Government Printer.
- Department of Agriculture, Forestry and Fisheries (DAFF). (2015). *The 5th annual report of the status of cooperatives in the sector 2015/16*. Pretoria: Government Printer.
- Department of Trade and Industry (DTI). (2005). *Cooperative Act 14 of 2005*. Pretoria: Government Printer.
- Department of Trade and Industry (DTI). (2012). *The DTI Integrated Strategy on the development and promotion of cooperatives: promoting an integrated cooperative sector in South Africa 2012-2022*. Pretoria: Government Printer.
- Department of Trade and Industry (DTI). (2016). *Cooperative Act 14 of 2005*. Pretoria: Government Printer.
- Derr, J.B. (2013). *The cooperative movement of Brazil and South Africa*. Sustainable Development 01/2013. Rosa Luxemburg Foundation. Southern Africa.
- Doyon, M. (2002). An overview of the evolution of agricultural cooperatives in Quebec. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie*, 50(4), 497-509.
- Guesmi, B. (2013). *The productive efficiency in agriculture: recent methodological advances*. Doctoral thesis: Agricultural Economics. Polytechnic University of Catalonia, Spain.

Helmberger, P. & Hoos, S. (1962). Cooperative enterprise and organisation theory. *Journal of Farm Economics*, 44, 275-290.

Ito, J., Bao, Z. & Su, Q. (2012). Distributional effects of agricultural cooperatives in China: exclusion of smallholder and potential gains of on participation. *Food Policy*, 37(6), 700-709.

Janda, S. & Seshadri, S. (2001). The influence of purchasing strategies on performance. *Journal of Business & Industrial Marketing*, 16(4), 294-308.

Kumar, V., Wankhede, K.G. & Gena, H.C. (2015). Role of cooperatives in improving livelihood of farmers on sustainable basis. *American Journal of Educational Research*, 3(10), 1258-1266.

Li, C. (Ed.). (2010). *China's emerging middle class: beyond economic transformation*. Brookings Institution Press.

López, A. & Marcuello, C. (2006). Agricultural cooperatives and economic efficiency. *New Medit*, 5(3), 16-22.

Machete, C.L. (1990). Factors contributing to poor performance of agricultural cooperatives in less developed areas. *Agrekon*, 29(4), 305-309.

Marwa, W.N. (2015). Efficiency and sustainability of Tanzanian saving and credit cooperatives. PhD Dissertation submitted to the University of Stellenbosch.

Mude, A. (2006). *Weakness in institutional organisation: explaining the dismal performance of Kenya's coffee cooperatives*. Contribution paper presented at the International Association Agricultural Economist Conference, Australia (August 12-18, 2006).

Nilsson, J., Svendsen, G.L.H. & Svendsen, T.G. (2012). Are large and complex agricultural cooperatives losing their social capital? *Agribusiness International Journal*, 28(2), 187-204.

Ortmann, G.F. & King, R.P. (2007a). Agricultural cooperatives I: history, theory and problems. *Agrekon*, 46(1), 18-46.

Ortmann, G.F. & King, R.P. (2007b). Agricultural cooperatives II: can they facilitate access of small-scale farmers in South Africa to input and product markets? *Agrekon*, 46(2), 219-244.

Österberg, P. & Nilsson, J. (2009). Members' perception of their participation in the governance of cooperatives: the key to trust and commitment in agricultural cooperatives. *Agribusiness: An International Journal*, 25(2), 181-197.

Pongpanich, R. & Peng, K.C. (2016). The efficiency measurement of container ports in Thailand by using DEA Windows analysis approach. *International Journal of Innovative Research & Development*, 5(5), 247-253.

Prakash, D. (2000). *Development of agricultural cooperatives: relevance of Japanese experiences to developing countries*. Paper presented at the 14th ICA Japan International Training course on "strengthening management of agricultural cooperatives in Asia", held at IDACA, Japan, 18 April 2000.

Ruben, R. & Heras, J. (2012). Social capital, governance and performance of Ethiopian coffee cooperatives. *Annals of Public and Cooperative Economics*, 83(4), 463-484.

Sergaki, P. & Semos, A. (2006). The Greek Unions of agricultural cooperatives as efficient enterprises. *Agricultural Economics Review*, 7(2), 15-27.

Stattman, S.L. & Mol, A.P.J. (2013). Social sustainability of Brazilian biodiesel: the role of agricultural cooperatives. *Geoforum*, 54, 282-294.

Syrjä, P., Sjögrén, H. & Tuominen, P. (2012). Financial performance and efficiency of consumer co-operatives and limited companies – agency theoretical approach. *Journal of Co-operative Accounting and Reporting*, 1(1), 53.

Xaba, T., Marwa, N. & Mathur-Helm, B. (2018). Efficiency and profitability analysis of agricultural cooperatives in Mpumalanga, South Africa. *Journal of Economics and Behavioral Studies*, 10(6), 1-10.

Xaba, S., Marwa, N. and Mathur-Helm, B. (2019), "Efficiency evaluation of agricultural cooperatives in Mpumalanga: An empirical study using the DEA approach", *African Journal of Economic and Management Studies*, Vol. ahead-of-print No. ahead-of-print

Yoo, C.K., Buccola, S. & Gopinath, M. (2013). Cooperative pricing and scale efficiency: the case of Korean rice processing complexes. *Agricultural Economics*, 44, 309-321.

CHAPTER 2

THE LANDSCAPE AND OVERVIEW OF AGRICULTURAL COOPERATIVES DEVELOPMENT IN SOUTH AFRICA

2.1 INTRODUCTION

Globally the origin of cooperatives (formed as credit unions) dates back to Rochdale around 1844 and was the step to social and political change in Europe. It was formed as a consumer cooperative established by a group of workers representing various trades who formulated a set of basic operating rules based on a two-year study of cooperatives (Ryder & Chambers, 2009). Over the centuries, the cooperative movement was established in other countries. According to the International Cooperative Alliance (ICA), there is a plethora of records of co-operatives, which started out as small grassroots organisations in Western Europe, North America and Japan in the middle of the nineteenth century; however, the Rochdale is regarded as the prototype in the formation of cooperatives (ICA, 2016)⁴.

In Africa the mobilisation and formation of cooperatives dates back to the 20th century, and are marked by colonisation, in particular British colonies. They survived transition of powers: as in most African countries they were previously controlled by colonial governments and later by nationalist governments after independence (Satgar, 2007; Marwa, 2015). In many African countries, cooperatives were considered primarily as tools to execute certain economic or political functions on behalf of the government, not as autonomous, member-based organisations that created self-employment (Schwettmann, 1997).

The formation of cooperatives in South Africa is similar to that in other African countries, in that it can be traced back to the early 20th century and will be further discussed in this chapter. Globally, Africa (including South Africa) subscribes to the principles of the ICA (Ortmann & King, 2007a; Pollet, 2009).

The ICA was founded in 1895 as a non-governmental cooperative federation or cooperative union that represents the cooperative movement worldwide. The ICA values are premised on seven principles: (i) voluntary and open membership, (ii) democratic

⁴ <https://ica.coop/en/whats-co-op/history-co-operative-movement>.

member control, (iii) member economic participation, (iv) autonomy and independence, (v) education, training and information, (vi) cooperation among cooperatives, and (vii) concern for community. The ICA also affirms to the values of self-help, self-responsibility, democracy, equality and solidarity (Satgar & Williams, 2013).

South Africa's Cooperative Act 14 of 2005 subscribes to the values as in the ICA, in that it has the same values of self-help, self-reliance, self-responsibility, democracy, equality and social responsibility (DTI, 2005). The Cooperative Act 14 of 2005 was regarded as legislation that will see stakeholders working together to promote a self-sustaining cooperative movement in South Africa (Ortmann & King, 2007a). The agricultural cooperatives are regulated within the Cooperative Act 14 of 2005.

This chapter provides an overview of the legislation and development of agricultural cooperatives in South Africa. The chapter starts by providing an overview of different forms of cooperatives (not the different theories as they will be covered under the literature review), followed by the legislation and development of cooperatives in South Africa pre-1994, and post-1994. The chapter ends with a summary and conclusion.

2.2 AGRICULTURAL COOPERATIVE STRUCTURES AND FUNCTIONS GLOBALLY AND IN SOUTH AFRICA

The functions of cooperatives are underpinned by the user-owned and user-benefit principles. Cooperatives have been established worldwide to serve the interests of members, including consumer, producer, worker, and service cooperatives. Over and above these various cooperative types provide members with diverse products and services, including financial services, equipment and farm supplies, marketing of agricultural products, consumer goods, and utilities (Ortmann & King, 2007b).

The Cooperative Act 14 of 2005 defines an agricultural cooperative as "a co-operative that produces processes or markets agricultural products and supplies agricultural inputs and services to its members". It should be noted that the structure of agricultural cooperatives is not homogenous globally, in Africa and in South Africa, and that the nature of cooperatives operations are not the same. However, the organisation/structure globally and from country to country seem to be similar. Globally and in Africa, cooperatives take various forms; but primary and secondary cooperatives are distinct and similar across countries. At the primary level, individual members form a 'cooperative', at the secondary level cooperatives form the unions or cooperative societies and are members of the

secondary cooperatives (Wanyama, Delvetere & Pollet, 2009; DTI, 2012). The promulgation of the Act (14 of 2005) necessitated that cooperatives register and thus have legal status, and strengthened governance as it makes provision for boards to provide oversight (Lyne & Collins, 2008).

South Africa has also formed tertiary cooperatives. The Cooperative Act 14 of 2005 also makes provision for tertiary cooperatives and defines a tertiary or apex cooperatives, as “a co-operative whose members are secondary co-operatives and whose object is to advocate and engage organs of state, the private sector and stakeholders on behalf of its members and may also be referred to as a co-operative apex”.

Within the agricultural sector, South Africa has three broad categories: (i) marketing cooperatives, which have the responsibility to bargain for better prices and sell farm products; (ii) farm supply cooperatives, which may purchase in volume and distribute farm inputs such as seed and fertiliser; and (iii) service cooperatives, which provide services such as trucking, storage, ginning mechanisation, and insurance to list a few ‘services’ (Cropp & Ingalsbe, 1989; Ortmann & King, 2007b). These three categories are post-production related activities (DAFF, 2015). The majority of the 2,862 cooperatives recorded in 2015 are production cooperatives focusing on a particular commodity production and marketing.

The numbers indicate that other categories command fewer numbers, this is evident in that only 39 cooperatives were processing cooperatives, 43 were marketing cooperatives and 41 were input supply cooperatives, with the balance of 2.739 being categorised as commodity production and marketing. This study focuses on a combination of all the categories and is informed by the nature of the agricultural cooperatives in Mpumalanga, in that the functions appear to cut across the three categories: for example, a marketing cooperative can also provide mechanisation support to other farmers, and a primary commodity cooperative will market its produce in certain areas and can at the same time also provide mechanisation support to other farmers. The core vision is to maximise benefits for the members of the cooperatives.

2.3 EVOLUTION OF COOPERATIVES AND LEGISLATION DEVELOPMENT IN SOUTH AFRICA

2.3.1 Pre-democracy (1863-1994)

This section focuses on pre-democracy, before 1994. The South African cooperative development dates back to the early 20th century. In South Africa, the first formally registered cooperative in South Africa was the Pietermaritzburg Consumers Cooperative which came into existence in 1892 in terms of the Companies Act, which included consumer cooperatives, as well as agricultural, housing and financial services. The formation of cooperatives was as a result of establishing white supremacy, where government provided support to white entities (Satgar, 1999; Ortmann & King, 2007a).

Subsequent to 1892, the development was followed by the establishment of the National Cooperatives Dairies Limited in the early 1900s in the then Natal (Ortmann & King, 2007a). Other cooperatives, particularly agricultural cooperatives, were registered under the Companies Act until 1908 when the first Cooperative Act was passed (Nigrini, 2001; DTI, 2012). A significant development in agriculture was the formation of the Land Bank in 1912: it was formed as an agricultural cooperative and was intended to provide access to finance to white farmers (DTI, 2012).

The legislation that was to follow and regulate cooperative support and agricultural development were the 1912 Land Settlement Act, and the 1913 and 1936 Land Acts, which were fundamental towards the act of land dispossession from the black communities. These Acts were premised on the Union of South Africa in 1910 which created the opportunity to establish an appropriate institutional framework for land settlement, and holistic and comprehensive support was provided to white farmers by government (Troskie, 2008). Over and above that, white farmers were backed by ready access to finance through the Land Bank (Philip, 2003).

The Cooperatives Societies Act of 1922 was replaced by the Co-operative Societies Act 29 of 1939, which came into operation on 1 September 1939, this was as a result of recommendations made by the Commission of Inquiry into Co-operatives and Agricultural Credit of 1934 (Nigrini, 2001; Satgar, 2007). Literature is scanty on the preambles for the Acts, however agricultural cooperatives became organised as local monopolies bolstered by complex marketing schemes, which were designed to protect producers. This was the era of dispossession and control of land, which became key to the virtual monopolisation

of the resources and institutions of agricultural production by white farmers, while in the meantime a black working class began to be formed (Bernstein, 1996).

Marketing boards were established in 1937 through the Agricultural Marketing Act, with the mandate of fixing prices for agricultural commodities. The state supported the structures through tax exemptions and subsidies (DTI, 2012). This market continued to support white farmers, who benefitted through trading locally and internationally. Marketing boards were abolished in the 1990s, as they could no longer serve as agents (regional monopolists) for government (Piesse, Doyer, Thirtle & Vink, 2005). The abolition came with deregulation and introduced the marketing of agricultural products in deregulated and relatively free markets with minimal government intervention, and gradually changed the structure and responsibilities of the actors (Doyer, D'Haese, Kirsten & Van Rooyen, 2007)

During the 1980s cooperatives were seen as a tool to address poverty and social deprivation amongst black communities. Post 1980, it is argued that trade unions started developing co-operatives as a vehicle to address retrenched and redundant workers' economic needs. Both the Union of Metal Workers of South Africa (NUMSA) and National Union of Mineworkers (NUM) established cooperatives but these failed due to governance issues and mismanagement: each of these union-linked co-op initiatives had different ownership and control structures, and different forms of linkage with their 'home' union (Philip, 2003; Satgar & Williams, 2011).

The Cooperative Act 91 of 1981 promoted the registration of cooperatives, including black ones, and affirmed the registration of agricultural cooperatives in particular. Under the Act, three types of cooperative could be registered: agricultural cooperatives, special farmers cooperatives and trading cooperatives. The 1981 Act did not recognise the so-called informal co-operatives such as stokvels and burial societies, or any co-operative that complied with the seven international co-operative principles (Schoeman, 2006). However with the Cooperative Act of 1981 the market did not serve the cooperatives as there was inadequate definition of a cooperative and the state played an interventionist role, even the protection of members' interests was poorly articulated (Ortmann & King, 2007a). In this regard black communities did not realise the economic benefit of the Cooperative Act

After the enactment of the Cooperative Act of 1981, what was to follow was the transition in government, from the apartheid era to democracy in 1994.

It is interesting to note that pre-1994, white cooperatives were quite competitive in the market, however they were impacted by sanctions from other countries, and agriculture contributed more than 6% towards the GDP (Mather & Greenberg, 2003). The removal of state support around the 1980s, and the removal of subsidies saw some white commercial farmers negatively impacted, however the negative impact over the years is not clearly stipulated in literature. Post 1994 there was a deregulation of the agricultural sector, and it is assumed that the act of deregulation was going to result in improved efficiencies in the market (Lyne & Collins, 2008)

2.3.2 Post democracy (1994 to date)

Post 1994, driven by the transformational agenda, the South African government came up with the Reconstruction and Development Programme (RDP), which was the foundation and framework of the transformational agenda. It was intended to be a framework in which historical injustices could be addressed. The RDP put forward six principles, one of which is 'the democratisation of South Africa'. The RDP was therefore a foundation in which government policies and programmes and legislation were to be premised, as it was the framework that sought to mobilise people in achieving economic freedom (Gray, 2006)

Various legislations were enacted post the RDP framework: important in 1997 there was development with regard to the cooperative movement, and the National Co-operative Association of South Africa (NCASA) was established. It was formed by 30 primary co-operatives and a few secondary co-operatives, and the secondary cooperatives later formed an apex cooperative. The structure was disintegrated and national offices closed within the first two years, as it failed to establish proper provincial structures and sectoral bodies (DTI, 2012). The existence of NCASA worked counter-developmentally, it set back the transformation and the economic integration of the cooperatives (Philip, 2003).

In 2002, South Africa was a signatory to the International Labour Organisation (ILO) Recommendation 193 of 2002 for the Promotion of Co-operatives. The Growth and Development Summit Agreement of 2003 prioritised co-operatives development as one of the drivers of economic development in the country (Satgar & Williams, 2013).

The Broad-Based Black Economic Empowerment Act (2003) served as a basis for the Cooperatives Development Policy (2003) and the AgriBEE Charter (2004). The Cooperative Development Policy of 2003 for South Africa had various policy objectives, including (i) to promote the development of economically sustainable co-operatives that

will significantly contribute to the country's economic growth; and (ii) to increase the number and variety of economic enterprises operating in the formal economy (DTI, 2004).

The AgriBEE Charter was enacted in 2004, the objective of which was to ensure increased access and equitable participation in the sector, with its vision being to pursue Broad-based Black Economic Empowerment in support of a United and Prosperous Agricultural Sector (NDA⁵, 2005). The AgriBEE Charter sought to catalyse a moral, political, social and fundamental economic imperative for South Africa's collective future. By increasing access and equitable access, section 2 (b) makes reference to "facilitating ownership and management of enterprises and productive assets by black communities, workers, cooperatives and other collective enterprises" (NDA, 2005).

In the year 2004 the DTI initiated the Cooperative Development Programme, subsequent to which the functions of agricultural cooperatives were transferred from DAFF to the DTI. This was intended to strengthen the focus on cooperative development and support, and to ensure they are supported and governed as legal entities or businesses (Lyne & Collins, 2008; DTI, 2012).

The Cooperatives Act (No. 14 of 2005) preamble recognises that a self-sustaining cooperative movement can play a major role in the economic and social development of the Republic of South Africa and that the South African economy will benefit from increasing the number and variety of viable and sustainable economic enterprises (DTI, 2012). This Act provided clarity on the cooperatives as institutions and also on governance and functions (Ortmann & King, 2007a; DTI, 2012). This enactment saw a high growth rate of registrations of cooperatives: registrations in 2005 compared to 1922-2004 (82 years) quadrupled within a period of four years (2005-2009), with a growth rate of 86% because of enabling legislation (DTI, 2012). Government also sought to improve the focus and support, and the functions of the agricultural cooperatives were transferred from DAFF to the DTI to ensure that there was a dedicated department that would coordinate stakeholders for holistic support, promote investment (DAFF, 2012).

In 2014 the government transferred the functions of the cooperatives from the DTI to DSBD (Muswema, Okem, Blotnitz & Oelofse, 2018), needless to say there is still ambiguity on the impact as a result of the transfer of functions, and more so as to what the policy is and who takes the responsibility of oversight.

⁵ NDA: National Department of Agriculture before the name was changed to DAFF in 2008

The current discourse then propels that we look at the progress made since the inception of the Cooperative Act 14 of 2005, and the appetite that came with the enactment: literature indicates that the high registrations was coupled with high failure rate. As argued in the introduction, the economy is still yet to realise the benefits of the transformational economic agenda.

2.4 CONCLUSION

The chapter narrated and gave a historical context for the development of cooperatives. Literature points out that cooperative development in South Africa dates back to the 20th century, similar to other African countries; it is marked with the transition from colonisation to decolonisation, and in the case of South Africa being pre-democracy to post-democracy. Pre-democracy, government support was directed towards white farmers, and created monopolies marginalising the black farmers, while post democracy government came with a transformational agenda.

Post democracy government introduced policies and legislation to transform the economy, these were to be realised through the RDP, the AgriBEE, and the Cooperative Act 14 of 2005, with the latter seeing a high growth of cooperative registrations. To date the progress made in relation to realising the objectives of transformation still cannot be confirmed by empirical evidence. The gains of transformation and objectives of the government in relation to agricultural cooperatives which are sustainable enterprises is still yet to be realised, where it can be demonstrated that the legislation and government policies managed to integrate the agricultural cooperatives into the main economy. In this regard policy makers, managers, and stakeholders need to have an integrated view to change the status quo for improved performance in the sector.

2.5 REFERENCES

- Bernstein, H. (1996). How white agriculture (re)positioned itself for a 'New South Africa'. *Critical Sociology*, 22(3), 9-36.
- Cropp, R. & Ingalsbe, G. (1989). Structure and scope of agricultural cooperatives. In Cobia, D. (ed.), *Cooperatives in Agriculture*, pp. 35-67. Englewood Cliffs, NJ: Prentice-Hall.
- Department of Agriculture, Forestry and Fisheries (DAFF). (2012). *A report on the Agricultural Cooperatives Indaba*. Pretoria: Government Printer.
- Department of Agriculture, Forestry and Fisheries (DAFF). (2015). *The 5th annual report of the status of cooperatives in the sector 2015/16*. Pretoria: Government Printer.
- Department of Trade and Industry (DTI). (2004). *Cooperative development policy for South Africa*. Pretoria: Government Printer.
- Department of Trade and Industry (DTI). (2005). *Cooperative Act 14 of 2005*. Pretoria: Government Printer.
- Department of Trade and Industry (DTI). (2012). *The DTI Integrated Strategy on the development and promotion of cooperatives: promoting an integrated cooperative sector in South Africa 2012-2022*. Pretoria: Government Printer.
- Doyer, O.T., D'Haese, M.F., Kirsten, J.F. & Van Rooyen, C.J. (2007). Strategic focus areas and emerging trade arrangements in the South African agricultural industry since the demise of the marketing boards. *Agrekon*, 46(4), 494-513.
- Gray, Mel. (2006). The progress of social development in South Africa. *International Journal of Social Welfare*, 15: S53-S64.
- Kaplan, D.E. (1976). The politics of industrial protection in South Africa, 1910–1939. *Journal of Southern African Studies*, 3(1), 70-91.
- Lyne, M. & Collins, R. (2008). South Africa's new Cooperatives Act: A missed opportunity for small farmers and land reform beneficiaries. *Agrekon*, 47(2), 180-197.
- Marwa, W.N. (2015). *Efficiency and sustainability of Tanzanian saving and credit cooperatives*. PhD Dissertation submitted to the University of Stellenbosch.
- Mather, C., & Greenberg, S. (2003). Market liberalisation in post-apartheid South Africa: the restructuring of citrus exports after 'deregulation'. *Journal of Southern African Studies*, 29(2), 393-412.

Muswema, A.P., Okem, A., Blottnitz, H. & Oelofse, S.H. (2018). Cooperatives in waste and recycling: A recipe for failed waste hierarchy implementation?

National Department of Agriculture (2005) AgriBEE Steering Committee. Broad-Based Black Economic Empowerment draft transformation charter for Agriculture. Pretoria: Department of Agriculture.

Nigrini, M. (2001). Empowering poor rural villages through the provision of financial services by means of financial service cooperatives: A preliminary investigation into Financial Service Cooperatives in South Africa. In *International Jubilee Conference of the Economic Society of South Africa* (pp. 13-14).

Ortmann, G.F. & King, R.P. (2007a). Agricultural cooperatives I: history, theory and problems. *Agrekon*, 46(1), 18-46.

Ortmann, G.F. & King, R.P. (2007b). Agricultural cooperatives II: can they facilitate access of small-scale farmers in South Africa to input and product markets? *Agrekon*, 46(2), 219-244.

Philip, K. (2003). *Co-operatives in South Africa: Their role in job creation and poverty reduction* (pp. 3-5). Johannesburg: South African Foundation.

Piesse, J., Doyer, T., Thirtle, C. & Vink, N. (2005). The changing role of grain cooperatives in the transition to competitive markets in South Africa. *Journal of Comparative Economics*, 33(1), 197-218.

Pollet, I. (2009). *Cooperatives in Africa: the age of reconstruction: synthesis of a survey in nine African countries*. Dar Es Salaam: ILO.

Ryder, N. & Chambers, C. (2009). The credit crunch—are credit unions able to ride out the storm? *Journal of Banking Regulation*, 11(1), 76-86.

Satgar, V. (1999). Discussion Paper: Cooperatives and Development. COPAC (*co-operative and policy alternative centre*).

Satgar, V. (2007). The state of the South African cooperative sector. *South Africa: COPAC (co-operative and policy alternative centre)*.

Satgar, V. & Williams, M. (2011). The worker cooperative alternative in South Africa. *New South Africa Review 2: New Paths, Old Compromises*, 202-220.

Satgar, V. & Williams, M. (2013). Co-operatives and nation-building in post-apartheid South Africa: Contradictions and challenges.

Schoeman, N.F. (2006). *The co-operative as an appropriate form of enterprise for Black Economic Empowerment* (Doctoral dissertation, University of the Free State).

Schwettmann, J. (1997). Cooperatives and employment in Africa. Occasional Discussion Paper 97-1. International Labour Association (ILO).

Troskie, D. (2008). Lessons from the past: land reform at Vaalharts. *Agriprobe*, 5(4), 6-9.

Wanyama, F.O., Develtere, P. & Pollet, I. (2009). Reinventing the wheel? African cooperatives in a liberalized economic environment. *Annals of Public and Cooperative Economics*, 80(3), 361-392.

CHAPTER 3

THEORETICAL BACKGROUND, LITERATURE REVIEW AND PERFORMANCE EVALUATION FRAMEWORK

3.1 INTRODUCTION

Cooperatives are regarded as entities which are means of integrating communities in the mainstream economy and are often highlighted to be playing much bigger economic role (Zeuli & Radel, 2005). They are organisations that operate on a broader set of values, rather than being narrowed to profit objective (Stattman & Mol, 2014). This is through them being a business and at the same time encouraging a voluntary membership base (Schwettmann, 1997). The performance of agricultural cooperatives is therefore complex compared to a business that has one objective, and this results in them being faced by unique challenges, which may result in their performance being compromised (Marwa, 2015). Performance of agricultural cooperatives and the drivers of performance become fundamental in ensuring that cooperatives continue to meet their economic objective(s). Performance evaluation becomes important, and literature points out there are various approaches towards performance evaluation.

Based on a comprehensive literature, review different frameworks and debates on performance evaluation emerge with the theory of producer behaviour playing a dominant role (Harris, Stefanson & Fulton, 1996). There are three major approaches to performance evaluation: economic approach, accounting approach, and those studies mixing economic and accounting approach (Marwa, 2015; Soboh, 2009). The accounting approach applies the financial ratios, and the economic approach is the frontier method (parametric and non-parametric approach): mixing the economic and accounting approach combines the two methodologies.

This chapter is structured as follows: Section 3.2 provides a theoretical literature review, with a subsection on the theory of cooperatives, the focus being on the economic theory of agricultural cooperatives. The section elaborates on some of the schools of thoughts underpinning the behaviour of cooperatives. The theory of a firm is used interchangeably with the producer theory. Section 3.3 explores agricultural cooperatives and performance evaluation (analytical framework) and includes performance evaluation, employing the accounting approach (financial ratios) and economic approach (parametric and non-

parametric approach). Stochastic Frontier Analysis (SFA) is the parametric approach and Data Envelopment Analysis (DEA) is the non-parametric approach. The chapter is then summarised in Section 3.4 which is the conclusion.

3.2 THEORETICAL LITERATURE REVIEW

3.2.1 Economic theory of agricultural cooperatives

The theoretical literature review looks at the development of school of thoughts or models of how the cooperatives behave. The theory has evolved from Helmberger and Hoos's model of optimisation with a single objective by a single agent (Helmberger & Hoos, 1962), to Phillips, who advanced that cooperative members are a group of agents with identical goals: he argued that a cooperative was an association and not a firm independent from its owner's patrons (Phillips, 1953). From contractual point of view of cooperatives' constitutions, a fundamental of Zusman's model was that cooperatives' decision making is found in non-strategic majority rule voting of members (Zusman, 1992). The evolution and the behaviour of cooperatives have adopted various forms of institutionalisation and are not homogenous across different countries. The difference in the schools of thoughts is underpinned and informed by how a cooperative or a firm is expected to behave under normal conditions.

This section unpacks the different theories and school of thoughts, highlighting what has been the key contribution from the various theories.

Table 3.1 below summarises the theory development on cooperatives.

Table 3.1: Cooperative theory development

Theory	Key contribution	References
Theory of a firm	<ul style="list-style-type: none"> • Input minimisation constraints • Firm predicts that the behaviour of a firm is to maximise profits • Allocation of resources comes under single authority • Objective to maximise benefits for members 	Emalianoff, 1942 Enke, 1945 Helmberger & Hoos, 1962
'Associations' or integrated firms /	<ul style="list-style-type: none"> • Joint actions by firms • Gaining benefits from vertical 	Phillips, 1953 Harris, Stefanson, & Fulton,

New Generation Cooperative	<p>integration</p> <ul style="list-style-type: none"> • Only its member firms incurred profits or losses 	1996
New Institutional Economics (NIE)	<ul style="list-style-type: none"> • Underpinned by property rights, contracting and agency theory • Drives the incentives of the contracting party • Focus on institutional constraints rather than profit maximisation 	Eilers & Hanf, 1999 Sykuta & Cook, 2001 Cook & Chaddad, 2004 Ortmann & King, 2007
Coalition theory	<ul style="list-style-type: none"> • Extension of Phillips (1953) integrated firms • Not widely explored, however uses the principle of joint benefits and joint risk sharing • This theory is sometimes used linked to game theory fundamentals 	Nash, 1951 Staatz, 1989 Branzei, Dimitrov & Tijs, 2008
Game theory	<ul style="list-style-type: none"> • Different players, with different objectives • Players do not choose single period dominant actions, but repetitive strategy may lead to cooperation • Prisoner's dilemma: players may exploit 'cooperation' to their own benefit 	Staatz, 1985 Neyman, 1985 Jervis, 1988 Doebelli & Hauert, 2005 Branzei et al., 2008

3.2.2 Cooperatives as a firm – classical theory

The classical theory of the firm predicts that the behaviour of a firm is to maximise profit subject to available inputs (input constraints), maximising benefits to members. The argument is that cooperatives behave in the same way as firms. Helmberger and Hoos spurred the debate further, holding that there are certain characteristics of a cooperative, which do not hold the same as those of a firm, citing that the cooperative is usually held as a non-profit making organisation (Helmberger & Hoos, 1962).

Scholars such as Helmberger and Hoos (1962) and Demsetz (1998) further elaborated that over and above the profit maximisation goal, cooperatives face allocative problems, and members are treated as entrepreneurs of a firm that specifies optimum rules of

behaviour with profit maximisation as the norm, this links cost minimisation with output maximisation as a fundamental principle (Helmberger & Hoos, 1962; Demsetz, 1988).

In the context of Helmberger and Hoos's theory of cooperative as a firm, they acknowledge the difference between investors seeking profits and member patrons of a cooperative. What holds the theory together towards that of a firm is that in a cooperative, members select a 'board' from within the members, so in both the firm and a cooperative, allocation of economic resources comes under a 'single' authority (Helmberger & Hoos, 1962).

Helmberger and Hoos also state that (i) cooperatives are management controlled, (ii) goals of the cooperative enterprise are motivated by survival & cooperative growth, (iii) expertise is required in decision making and cooperatives can be exposed to bankruptcy as a result of bad decision making, (iv) the cooperative internal organisation performance links dimensions of technical efficiency, level of returns to members and adaptation to new technologies (Helmberger & Hoos, 1962).

3.2.3 Cooperatives as a coalition

Although not widely explored, the fundamentals of the cooperative as a coalition have also been advanced as a theory, extending it from the international principles of cooperation. A mission of working together also drives the existence of the cooperatives, collectively taking decisions and collectively managing the business (Nash, 1951). The coalition theory is also regarded as the collective action theory. This theory explains the agricultural cooperatives as "a firm jointly controlled by multiple objective-optimising member patrons who derive user benefits primarily through transacting with the entity" (Cook & Burrell, 2009:8). The fundamentals are founded on having a common vision and risk residual being equal amongst all members (Branzei, Dimitrov & Tijs, 2008).

Not much literature or studies have pursued the coalition theory, a deep dive into the coalition model presents another school of thought, where studies view cooperatives as a coalition from game theoretic and institutional economics theory. These approaches are further covered under game theory and new institutional economic theory in the next sections.

3.2.4 Game theory – ‘prisoner’s dilemma’

The game theory posits that cooperatives’ members’ choices are not homogenous, cooperative members can either cooperate partial, fully or not fully at all (Branzei et al., 2005). The emphasis is on the ‘uncertainty’, as management decisions and interests may be different to those of ordinary members, this affirms that there are heterogeneous preferences within a cooperative (Ritzberger, 2002). Game theory deals with the fundamentals of group choice, and when members of the group are partially conflicting, or there are different agents at play with different objectives, at the end of each game there could be various outcomes (Staatz, 1985).

This is emphasised by Branzei et al. (2005), who argued that there could be levels of the game, from fuzzy to multichoice games, where players’ cooperation or non-cooperation may vary at different levels (Branzei et al., 2005) and this frequency-dependent selection is the structural problem of ‘cooperation’, the act of cooperation itself ultimately lies with who the individual a co-operator interacts with (Doebeli & Hauert, 2005). A compromise can also be reached: the voting members rule assumes that all members vote unanimously, with no independent view, preference is then determined by the ‘median’ member (Staatz, 1985).

The ‘prisoner’s dilemma’ is inherent in game theory as each player is satisfied to get close to (utility) to other players’ responses or strategy, and as the number of repetitions increases, the better the cooperation (Nash, 1985). Utility, equilibrium utility and pay off, at the end of the game the ultimate pay off becomes the incentive at which the individual cooperates: although members can benefit from cooperating with each other, they have an incentive to benefit more from exploiting the cooperation of others (Doebelli & Hauert, 2005). However there are collective gains in the cooperative game, but it is important that members must bargain with themselves to ascertain what is the net benefit for all members (Nash, 1985).

3.2.4 New institutional economic theory

It is argued that by the 1980s a new approach emerged where decision making was becoming more prominent and property rights theory emerged, which is the theory of new institutional economics (Cook & Chaddad, 2004). This theory highlights that contracting, agency and property rights allocation are what defines the behaviour of the firm or cooperative. The theory argues that a structure of contracting plays a crucial role in the

activities of trading parties. Sykuta and Cook (2001) argue that contracting, agency and property rights allocation suggest that cooperative contractors may be able to design contracts that enhance economic efficiency. However, it should be noted that property rights are not clearly defined under the new institutional economics theory (Sykuta & Cook, 2001).

This theory is further augmented by Ortmann and King (2007) in that the transaction costs analysis, agency theory and property rights analysis collectively focus on institutions and institutional constraints rather than profit maximisation. This new institutional economics is summed up by agency theory, transaction cost economics and property rights theory as determinants in the behaviour of a firm/cooperative (Cook et al., 2004; Ortmann & King, 2007).

A similarity in the different theories is that there is a common objective for which the member groups work together, with the benefits and risks of the firm being shared amongst the members (Cook & Burrell, 2009). Another similarity between the theories is that there is a constant need to maximise profits for shareholders, with the allocation problem being applicable to different theories.

Soboh, Oude Lansink, Giesen and van Dijk (2009) elaborated on the theory of agricultural cooperatives, linking them to behavioural patterns, as different countries may adopt different institutionalisations. They argued that cooperatives are not easily defined, as they do not have a standard ownership structure. Soboh et al. (2009) assumed cooperatives as 'firms' and categorised them into the following:

Independent enterprises: this theory assumes a cooperative is a firm which is independent with a single objective. In this theory the single objective is to maximise benefits for the members, where the optimal prices and quantities are determined by setting the cooperative's marginal cost equal to the marginal revenue, therefore profit becomes the main performance indicator.

Vertical integration: this is related to integration of autonomous firms, where the focus is to conduct optimal marketing programs for members. This is also viewed as the extension of the farm in a form of vertical integration, where producers mutually join together in a vertically integrated entity to secure the output flow in the downstream stage of the supply chain and to achieve optimal return for the farmer-member (Soboh et al., 2009). The authors acknowledged the theory as having been firstly analysed by Emelianoff (1942).

Coalition of firms: as a coalition, it is assumed that cooperatives have multiple objectives which could overlap with the vertical integration and enterprise as an independent firm, however the functions and benefits are of a coalition. The theory applies 'joint' benefits and 'joint' risk sharing to achieve economies of size by minimising costs and maximising growth opportunities. The 'coalition' of firms participate as a compromise set of decisions is reached. In a nutshell, the economic behaviour of a cooperative as a 'coalition' assumes that its participants maximise their own profits subject to the existence of the cooperative (Soboh et al., 2009). In this regard failure to agree on net benefits among players prevents the coalition from forming (Staatz, 1993).

With the various theories presented above, there appears to be different characteristics in the construct and behaviour of cooperatives; from input constraints whilst maximising profits (theory of a firm), joint decision making- joint risk bearers (coalition theory), agency problem, transaction costs and institutional arrangements being fundamental (NIE), cooperative members objectives not homogenous, may differ or cooperate at different levels, also may exploit cooperation levels to individual benefit (game theory). The common thread though remains to be that of a benefit of member. What remains constant in both the classical theory and the neo-classical theory is the profit maximisation objective, which has interplay between maximising output and minimising inputs (Demsetz, 1988; Cook, Chaddad & Illiopoulos, 2004).

This study will adopt the theory of a firm, as input constraints and profit maximisation remain an objective for South African cooperatives (also linked to the second study objective, to analyse if the cooperatives are profitable and sustainable).

The next section addresses empirical literature review on performance evaluation of cooperatives, focus on efficiency and profitability, to a certain degree link with the various theories, or school of thoughts.

3.3 EMPIRICAL LITERATURE REVIEW

3.3.1 Agriculture cooperatives performance evaluation (link with theoretical review)

Agricultural cooperatives have received economic attention globally and within Africa. There are various dimensions in which performance can be measured: several empirical studies have used efficiency and profitability as proxies for measurements. Several factors can lead to cooperatives performance or non-performance. In this section a review of the

empirical literature focuses on performance of cooperatives across various studies and countries: the measurement cuts across efficiency and profitability analysis. However, the theories applied or tested in the various studies differ from one another, from the theory of a firm/producer theory to new institutional economics and agency theory.

A debate on whether cooperatives' main objective is profit maximisation or consumer/member welfare is the crux of the different thinking on how cooperatives should behave. With this conflicting objective, the empirical studies advanced various theories in testing if cooperatives are efficient or not. Sexton and Iskow (1993) emphasised this dilemma of having to test for objectives, in an environment where the behaviour of a cooperative is driven by market forces. Their study, which focused on US cooperatives, signifies that cooperatives have tax benefits, access to favourable credit terms, and free technical assistance, which makes the cooperatives' objective questionable. Suffice it to mention that the theory of a firm was applied, as the cooperatives sampled were marketing cooperatives which were compared to Investor Owned Firms (IOFs). Their study found that cooperatives were not less efficient than investor owned firms (Sexton & Iskow, 1993).

Institutional arrangements, management and leadership seem to play a critical role in whether cooperatives can perform or not perform. In a study of credit cooperatives in Japan, institutional discrimination resulted in Japanese cooperatives being less efficient than foreign owned cooperatives (Fukuyama, Guerra & Weber, 1999). On the other hand, in a study done in the US, Cook (1994) investigated the role of management, where management behaviour was tested to influence cooperative performance. He found that cooperatives were negatively affected by management, if they remain strategically focused but do not define measurable goals on performance as they are user owned as compared to IOFs (Cook, 1994). In a study done in the province of KwaZulu-Natal in South Africa, it was found that institutional problems led to low levels of investment and reliance on government funding, and in the absence of that funding, cooperatives lost members which subsequently affected their performance (Chibanda, Ortmann & Lyne, 2009).

Cooperatives by nature are a group of individuals or individual firms: social capital has therefore been found to be fundamental to whether cooperatives perform or not. On investigating the Ethiopian coffee cooperatives, social capital and cohesion led to improved trust, which resulted in better performing cooperatives, but mostly favoured remotely located cooperatives (Ruben & Heras, 2012).

Government support, funding, capital access, and infrastructure development are drivers to cooperatives performing well. In the US cooperatives performance was mostly dependent on their ability to raise capital in order to invest in productive assets, and it was noted that if there is a capital investment, there is a marginal increase in profitability (Chaddad, Cook, & Heckelei, 2005). In Quebec agriculture cooperatives performed well as they embedded a 'mergers and acquisition' strategy, the consolidation resulted in farmers having more bargaining power and they had competitive advantage compared to other forms of organisations (Doyon, 2002). These studies embedded the theory of a firm in analysing performance objectives.

Sergaki and Semos (2006) investigated efficiency levels of agricultural cooperatives in Greece. In applying the theory of a firm, they argue that cooperatives are a form of enterprise structured to serve the needs of its members. In measuring performance, they advanced that profit was the most important parameter for the viability of a firm or cooperative. The results found that cooperatives struggled due to inefficiencies, and this was attributed to cooperatives failing to adapt to new technological developments and changing consumer demands (Sergaki & Semos, 2006)

Interestingly a study in Finland combined both efficiency and financial performance as proxies when measuring cooperative performance, the cooperatives were able to generate high surplus or profits, which the study stated was surprising given the theory underpinning cooperatives in Finland linked to generating consumer surplus. The agency theory was evident in the results as management of the cooperatives was found to have behaved in an opportunistic manner (Syrjä, Sjögrén & Tuominen, 2012).

In South Africa, Ortmann and King (2007) noted the development of the NIE theory, where transaction costs, agency theory and property rights are found to be inherent problems. The study, which was done in the province of KwaZulu-Natal, investigated the role on why cooperatives were formed in South Africa with the focus on poverty alleviation and job creation. But due to market distortions, the performance of cooperatives mostly affected members as control and influence became fundamental as the number of members increased. Poor management, low skill levels and lack of funding were contributing factors to the poor performance of the cooperatives (Ortmann & King, 2007).

The above studies and empirical findings indicate that cooperative theory may be applied differently in different countries, and within the theory of a firm, NIE, and coalition theory there appears to mixed results from the studies. Noting the various theories, this study will

proceed with the theory of a firm, given the South African context that as much as the primary objective of formation of cooperatives (post 1994) was intended to alleviate poverty and stimulate job creation, bargaining power remains critical, and therefore input minimisation and profit maximisation become fundamental objectives to ensure their sustainability.

The next section deals with agricultural cooperatives' performance evaluation and analytical framework.

3.4 AGRICULTURAL COOPERATIVES PERFORMANCE EVALUATION AND ANALYTICAL FRAMEWORK

The study will evaluate performance through the agricultural cooperatives business operations. It looks at efficiency, profitability and sustainability as key proxies of to measure and link the performance of the agricultural cooperatives. It is therefore important to give a brief definition of the parameters or terminology that will be used in the study – efficiency, profitability and sustainability – before providing an analytical framework for performance evaluation.

Efficiency: according to Koopmans, an input-output vector is technically efficient only if increasing any output or decreasing any input is possible by decreasing some other output or increasing some other input (Koopmans, 1951). Lovell (1994) defined two forms of efficiency: technical efficiency and economic efficiency.

Technical efficiency is defined as proficiency in which inputs to the production process are converted to the output of the process and is estimated by measuring the distance of the reference point to the constant returns to scale frontier and inefficient firms' distance from the same frontier (Marwa & Aziakpono, 2016). Lovell emphasised the theory of Farrell's definition of 'technical efficiency' of a relative notion, a notion that is relative to best-observed practice in a comparison group (Lovell, 1994).

Economic efficiency refers to the proficiency with which producers achieve their economic objective, such as production at minimum cost and generation of maximum revenue. Lovell (1994) argued that economic efficiency has a component of technical efficiency. This study adopted efficiency measurement on technical efficiency as a proxy. Technical Efficiency (TE) was decomposed into Pure Technical Efficiency (PTE) and Scale Efficiency (SE).

Pure Technical Efficiency (PTE) measures how far a firm is away from the production frontier under conditions of Variable Returns to Scale (VRS), which means it is measured as the ratio of the distance between inefficient points to the VRS efficient frontier (Marwa & Aziakpono, 2016). Scale Efficiency (SE) is relative to the firm (Banker, Charnes & Cooper, 1984).

Scale Efficiency measures the constant returns to scale (CRS) and variable returns to scale (VRS). In this regard CRS is appropriate when all firms are operating at an optimal scale, scale efficiency for each DMU can be obtained by conducting for both CRS and VRS through DEA, and then decomposing the TE scores from CRS into two components, firstly due to SE and secondly due to 'pure' PTE (Charnes, Cooper & Rhodes, 1978).

Further to measuring technical efficiency, the study will also analyse the *profitability* of agricultural cooperatives. In economic theory it is argued that profits are at maximum when the implicit value of the last dollar spent on an input is one dollar. Profitability is measured as excess revenue when the firm has met its financial obligations (Debertin, 2012). In corporate finance literature, profit is commonly proxied by ROA and ROE (Muriu, 2011).

Since the study will be measuring sustainability, it is therefore defined. There are various dimensions of sustainability, including social sustainability, economic sustainability and financial sustainability. The social sustainability definition relates to how society and communities can be self-supporting by building social capital (Manzi, Lucas, Jones & Allen, 2010).

In economic terms, sustainability refers to the firms' means of meeting the needs of their present consumption without compromising the ability of future generations to meet their own needs (Heal, 1998). Financial sustainability is usually applied in Microfinance Institutions (MFIs) and Development Finance Institutions (DFIs) and is measured by the ability of a firm or DFI to continue operating without seeking grants or subsidised loans from outside funders, this is driven by the firm's ability to be operationally self-sufficient (referred to as OSS) and financially self-sufficient (FSS) (Morduch, 2005; Zeller & Meyer, 2002; Muriu, 2011).

The study adopts and focuses on the financial sustainability dimension and investigates performance proxies of cooperatives in relation to efficiency, profitability and sustainability.

The three major performance proxies (technical efficiency, profitability and financial sustainability) can be measured through an accounting approach, economic approach or a combination of the two.

3.4.1 Accounting approach

With the accounting approach, performance evaluation in relation to profitability, efficiency and sustainability are measured through financial ratios. Commonly used financial ratios are Return on Assets (ROA) and Return on Equity (ROE).

Financial ratio analysis has developed from a single ratio, single output for a single purpose analysis. Financial ratio analysis deals with predicting returns and factors in various ratios to determine a particular output. Kendall applied the methodology and tested whether the future could be predicted using past returns (Kendall, 1953 as cited by Lewellen, 2004). Theoretical review indicates that financial ratios can help establish the firm's performance; this is emphasised by the fact that they enable the organisation to evaluate its financial health by comparing and benchmarking with other companies in the same industry. It is argued that financial ratio analysis is employed to look at the performance and profitability in totality, as it employs the measurements of profitability and liquidity (Sergaki & Semos, 2006).

Return on assets (ROA) measures the overall profitability and reflects both the profit margin and how efficiently the firm is using the total assets to generate revenue: it is computed as the net revenue to the total assets. The limitation drawn in the method is that it can be biased due to off balance sheet items (Lewellen, 2002). *Return on equity* (ROE) is the amount of net income returned as a percentage of the shareholders' investment (equity). ROE provides insights on how efficiently the firm operates. What is regarded as a limitation of ROE application is that it disregards risks associated with high leverage. The limitations of using ROA and ROE as profitability measurements is that they provide a snapshot and may fail to demonstrate a multi-dimensional view of the performance of the firm (Muriu, 2011).

For the purpose of this study, profitability, and technical efficiency will be linked to sustainability in order to measure the performance of agricultural cooperatives. The theory and context argues that firms can be profitable for a short term, without having the leverage to sustain operations for a long period (Morduch, 2005).

Financial sustainability can be evaluated through measuring financial self-sufficiency (FSS) and operational self-sufficiency (OSS). With OSS, the firm is measured with its ability to cover its operating expenses with its operating income, whereas the FSS measures the extent to which operating costs can cover the firm's costs (Zeller & Meyer, 2002; Muriu, 2011).

Economically sustainable organisations guarantee anytime cash flow, at the same time providing persistent above average returns to shareholders (Dyllic & Hokerts, 2002). For a firm to be sustainable, it requires private profits, which are ROE net of subsidy that exceeds the private opportunity cost of resources (Marwa, 2015). The firm or business profit is also a source of equity and can also be reinvested to promote financial stability (Muriu, 2011). As in the firm, within the agricultural space, sustainability is regarded as the capacity of a farm or business to survive various risks and other financial shocks (Lien, Hardaker & Flaten, 2007).

However, in the same context, it should also be noted that profitability does not always translate to sustainability, this has also been argued on the basis that an organisation can be profitable, but not sustainable (Morduch, 2005; Muriu, 2011).

With the above, there is a case to evaluate performance based on financial ratio analysis, however: a limitation pointed out in the ratio analysis approach is that can be biased due to off balance sheet items (Lewellen, 2002). In addition, financial ratios provide a 'snapshot' and may fail to demonstrate the multi-dimensional view of the performance of the firm (Muriu, 2011). Altman (1968) made an example of such pitfalls, citing that ratio analyses are sometimes susceptible to faulty interpretation, as in the case where a firm with a poor profitability/solvency record may be regarded as a potential bankrupt. However, because of its above average liquidity the situation may not be considered serious. This then results in 'ambiguity' in the results (Altman, 1968).

With these limitations noted, the study will be introducing the economic frontier approach under the performance evaluation framework. The next section deals with the economic approach in performance evaluation.

3.4.2 Economic approach

Performance measurement can also be estimated through an economic approach, which employs a parametric and non-parametric approach. The frontier approach methods that will be covered in this section are the parametric approach – Stochastic Frontier Analysis

(SFA), and the non-parametric approach – Data Envelopment Analysis (DEA). Other frontier approaches can be employed: although the most commonly used are SFA and DEA, it should be indicated that each approach has its strength and its weaknesses (Lovell, 1994; Murillo-Zamorano, 2004; Cullinane, Wang, Song & Ji 2006; Marwa, 2015). Literature points out that the original deterministic frontier analysis is the DFA but was replaced by DEA as it became popular with productive efficiency analysis in the various sectors (Hjalmarsson, Kumbhakar & Heshmati, 1996). The section also acknowledges that under the economic approach there is recent work on the Stochastic DEA by Olesen and Petersen (2016).

3.4.2.1 Stochastic Frontier Analysis (SFA)

Stochastic Frontier Analysis (SFA) is a parametric approach and is applied as one methodology that can estimate productivity and efficiency of a DMU. SFA was developed on the theoretical literature of productive efficiency, which was introduced and published in 1977 by Meeusen and van den Broeck and also by Aigner, Lovell and Schmidt in the same year (1977). Both works resulted in developing the production frontier context (Kumbhakar & Lovell, 2000). SFA creates a framework that can analyse firms that do not succeed in optimisation, or that are not fully efficient. This is achieved by comparing firms to ‘best practice’ (Cummins & Zi, 1998).

Meeusen and van den Broeck’s methodology was influenced by work previously done by Koopmans (1951) and Debreu (1951). Koopmans defined technical efficiency as when a producer can no longer produce more of any output without requiring less of any inputs (Kumbhakar & Lovell, 2000). For Debreu (1951) and Shepherd (1953) it was the introduction of a distance function that enabled them to model multiple output technology as a way of measuring the radial distance from the frontier (Debreu, 1951; Shepherd, 1953).

In the SFA economic approach, the model introduces two error components: a random error term and inefficiency term, and it integrates two unobserved error terms representing inefficiency and statistical noise. The best the model can do is to obtain an estimate ‘mean’ efficiency over the sample (Andor & Hesse, 2011; Behr, 2016).

The advantage of SFA is that in estimating technical efficiency, it also acknowledges the fact that random shocks outside the control of producers can affect output, therefore it

captures the exogenous shocks beyond the control of the analysed units (Murillo-Zamorano, 2004; Cullinane et al., 2006).

Limitations of the model were pointed out by Førsund, Lovell and Schmidt in 1980: in SFA it is not possible to decompose individual residuals into their components, the best that SFA can do is to obtain 'mean' efficiency over the sample (Førsund, Lovell & Schmidt, 1980). It is also argued that it is not possible to estimate technical inefficiency by observation (Kumbhakar & Lovell, 2000).

The other limitation of SFA that has been pointed out is that of the functional form misspecification, where there is skewness of the inefficiency distribution, this always results in incorrect estimation due to wrong functional form and multicollinearity (Andor & Hesse, 2011).

3.4.2.2 Non-parametric approach: Data Envelopment Analysis (DEA)

Data Envelopment Analysis (DEA) is a nonparametric approach, which is a statistical procedure that has certain properties that hold under relatively mild assumptions regarding the underlying populations from which the data are obtained. DEA was popularised in 1978 by Charnes, Cooper and Rhodes (CCR), who followed up Farrell's (1957) work with the intention of measuring productive efficiency, where the firm is expected to increase its outputs by increasing its efficiency without absorbing further resources (Farrell, 1957). CCR published and popularised the model as a managerial and performance measurement tool, which was later to be referred to as the CCR model. The CCR model introduced the efficiency measurement which generalised the single output and single input ratio to multiple inputs and outputs without requiring pre-assigned weights (Charnes et al., 1978).

CCR applied the model for efficiency measurement in DMUs, where a DMU could be a firm or an agency, and the methodology emerged as an alternative to the traditional regression method analysis (Charnes et al., 1978). The DMU sought to establish an 'efficient frontier' that exhibits best practices, and then assigned the efficiency levels to the other non-frontier units according to their distances to the efficient frontier (Liu, Lu, Lu & Lin, 2013). The measurement of productive efficiency is to define a frontier envelopment 'surface', for all sample observations. The units that lie in the 'surface' are defined as 'efficient' DMUs (Murillo-Zamorano, 2004). In a nutshell, within the input-oriented model the DEA defines the frontier by seeking the maximum possible proportional reduction in

input levels, in the output model it seeks the maximum proportional increase in output production, with input levels held fixed (Coelli & Rao, 2005).

Banker, Charnes and Cooper (BCC) extended the initial CCR model, that of comprehending the technical and scale inefficiencies without requiring an *a priori* specification for a single ratio and a single output model. BCC introduced a new variable in the DEA estimation, they introduced a separate variable which made it possible to determine if operations were conducted in regions of increasing, constant or decreasing returns to scale in multiple input and multiple output situations. This model applied constant returns to scale (CRS) and variable returns to scale (VRS) to measure technical efficiency (Banker, Charnes & Cooper, 1984).

The non-parametric approach has the following advantages: there is no need to specify the relationship between inputs and outputs, and they require few assumptions about underlying populations (Paradi & Zhu, 2013). DEA is unit invariant in that, even when there is no price data, it will provide an estimation that takes into account 'shadow' pricing (Liu et al., 2013), and another key advantage is that DEA deals with individual DMUs as opposed to the population average: it utilises n optimisation for each DMU, this make DEA results more reliable (Moffat, 2008).

DEA has flexibility in that it does not impose weights attached to any inputs or outputs, it will calculate by solving the mathematical programming program, this allows DEA to measure comparative efficiency in environments where no *a priori* weights are known (Murillo-Zamorano, 2004).

Having pointed out the merits of DEA, it should be noted that DEA has limitations. One of the limitations is that DEA has a deterministic nature (Lovell, 1994). Farrell cited that there was always a limitation where efficiency was measured by constructing 'indices of efficiency' as the method compared weighted average of input with output, as it resulted in index number problems (Farrell, 1957), and this challenge remains with DEA estimation.

The challenges or limitations of DEA pointed out are of a deterministic nature, and not accounting for statistical noise, and can be addressed through a bootstrapping technique. Efron (1981) introduced the technique, and it has been widely applied by Simar and Wilson (2000). The technique is a data-based simulation method for statistical inference; and is a computer-based method for assigning measures of accuracy to statistical estimates. The term 'boot strap' as argued by Efron was that of 'holding together', or 'to

pull oneself up by one's bootstraps'. It is based on estimating the distribution of statistics based on 'independent' observations (Efron & Tibshirani, 1998; Simar & Wilson, 2000).

Scholars have indicated that another limitation on DEA is endogeneity. The challenge is that DEA assumes either that there is correlation between one input and inefficiency levels, or that there is a straightforward relationship from inputs to outputs (Cordero, Santín, Sicilia, 2013). This was also observed by Simar and Wilson (2001) as they indicated that the inclusion of irrelevant variables in the model can worsen the endogeneity problem in DEA estimation models (Simar & Wilson, 2001).

Endogeneity in estimation does not pose an analogous problem as the DEA places the envelope around performing firms, however there should be caution when comparing efficiency measures of different units with different endogenous inputs (Orme & Smith, 1996). The limitation can also be addressed by using an instrumental input DEA, also referred to as II-DEA, as it is known to outperform DEA when dealing with endogeneity (Santín & Sicilia, 2017).

It should be noted that the recent work done by Olesen and Petersen (2016) extended the static DEA to a stochastic DEA. They extended the deterministic DEA in three dimensions: (i) deviations from the deterministic nature, (ii) random noise and specification errors are made an integral part of the model, and (iii) the frontier is stochastic as is the underlying production possibility set (Olesen & Petersen, 2016).

Given the above literature, where the theory of a firm seeks to minimise inputs and maximise outputs, and the economic theory of cooperatives as a coalition of 'joint' benefits and 'joint' risk sharing driven by achievement of economies of size by minimising costs and maximising growth opportunities, the study proposes to adopt the theory of a firm in tandem with the coalition theory.

In the South African context, the theory of a firm applies, with the behaviour of profit maximisation as the norm, this then links cost minimisation with output maximisation (Helmberger & Hoos, 1962). Over and above the theory of a firm, in South Africa the coalition theory is relevant, as members work in a group and are naturally exposed to 'joint' benefits and 'joint' risk sharing in order to achieve economies of size by minimising costs and maximising growth opportunities (Soboh et al., 2009), however as indicated under the empirical literature the study can be adopting the theory of a firm.

The above literature assisted in understanding the performance framework and drivers of performance, using the accounting approach. employing the financial ratios (ROA, ROE,

OSS and FSS) and the economic approach; and parametric (SFA) and non-parametric (DEA) approaches. The empirical review also demonstrated the reliability of employing DEA to measure efficiency.

Accounting ratios and DEA are proposed and adopted for the study. On the empirical framework the DEA methodology has successfully been employed in agricultural cooperatives performance evaluation studies as indicated in the empirical literature review (Liu et al., 2013; Coelli & Rao, 2005). The advocates for applying DEA in measuring efficiency in agriculture have argued that the DEA method can be reliable without using price data due to the fact that agricultural input prices are usually not available, particularly in developing countries, making DEA most suitable to deal with the missing data prices (Coelli & Rao, 2005).

The above is also supported by the number of papers and studies that have applied it to produce reliable results. Liu et al. (2013), having surveyed DEA applications, opined that DEA is more robust in measuring efficiency than parametric approaches, this was informed by the investigation in relation to the proportion of application papers in the DEA literature: from 1978 to 2000, agriculture efficiency analysis was listed within the top five applications in which DEA has been applied (Liu et al., 2013).

Authors such as Coelli, Rahman & Thirtle (2002), Hambrusch, Kirner & Ortner (2006); Rahman & Awerije (2015) used DEA to estimate measures of farm performance, notably technical, allocative, economic and scale efficiency in agriculture.

For the purpose of this study efficiency will be analysed in the context of Technical Efficiency (TE), which can be decomposed into Pure Technical Efficiency (PTE) and Scale Efficiency (SE). The most favourable situation is to have efficiency scores that are as close as possible or equal to one, meaning the DMU is efficient enough. On the other hand, the most favourable position is to have the returns to scale of DMUs to be constant (CRS). A DMU is believed to be technically efficient if it using minimum inputs in its production to produce as much output as possible compared to other DMUs in its industry (Färe & Lovell, 1978).

Having indicated the proposed methodology, which is quantitative, it should be pointed out that the quantitative approach also has limitations. The quantitative method is 'detached' from the views of the subjects who understand the facts (Carr, 1994). Corner (1991), cited the limitation as 'assumptions' where data has been stripped from the natural context, or have been assumed not to have happened (Corner, 1991).

On the other hand, Campbell and Fiske (1959) argued that quantitative and qualitative approaches can be used complementarily, without having to compete on superiority. Campbell and Fiske (1959) advocated that more than one method should be used in the validation process to ensure that the variance is that of a trait and not of a method, to confirm that results are not only methodological artefact (Campbell & Fiske, 1959). The qualitative approach informs or is used to measure the performance of the empirical world from the perspective of a subject and not of the researcher (Carr, 1994).

With the above background in mind, the current study extends the current literature, which is mainly dominated by a quantitative approach, to include a qualitative approach, therefore extending to methodological triangulation. The qualitative study objective will investigate the stakeholder perceptions on the performance of the agricultural cooperatives. It is proposed that subject matter experts and cooperative managers will be interviewed. The rationale on the selection criteria is selecting participants who have insight and are knowledgeable on the topic (Thomas, MacMillan, McColl, Hale & Bond, 1995).

3.5 CONCLUSION

This chapter focused on the literature review, with economic theory of agricultural cooperatives being elaborated. In addition, an empirical literature review section discussed the merits of the study, how other studies were conducted in measuring efficiency, and what the results were. Due to the nature of the cooperatives, and their objective of profit maximisation, with members working together for a common vision, this study adopted the theory of a firm not ignoring the coalition theory as it is relevant to the South African context. With the analysis and in responding to the study objectives, the theory of a firm is adopted.

The analytical framework to measure performance for agricultural cooperatives provided us with the accounting ratio, and the economic approach, with the economic approach methods being the Stochastic Frontier Analysis and the Data Envelopment Analysis. Whilst both the SFA and DEA have limitations, the study adopted the DEA, and proposed to use bootstrapping to deal with the limitations of DEA (of stochastic nature).

The empirical literature provided various findings, which were informed by various drivers of performance. Empirical findings demonstrate that DEA had conclusive results. There

are various factors which drive or deter efficiency, from institutional discrimination, profitability and ability to raise capital amongst others.

The study further extends the quantitative approach to the qualitative approach, stakeholders will be interviewed to source stakeholder perception and inform the future policy direction of the agricultural cooperatives.

The next chapter focuses on efficiency, specifically technical efficiency, and is provided in essay format, which has been submitted to and accepted for publication by the *African Journal of Economic and Management Studies* (article number 635269)

3.6 REFERENCES

- Aigner, D., Lovell, C.K. & Schmidt, P. (1977). Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics*, 6(1), 21-37.
- Altman, E.I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance*, 23(4), 589-609.
- Andor, M. & Hesse, F. (2011). *A Monte Carlo simulation comparing DEA, SFA and two simple approaches to combine efficiency estimates*. Discussion paper No. 51. Centre of Applied Economic Research, University of Munster.
- Banker, R.D., Charnes, A., & Cooper, W.W. (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis. *Management science*, 30(9), 1078-1092.
- Behr, A. (2015). Stochastic data envelopment analysis. In *Production and Efficiency Analysis with R* (pp. 161-182). Cham, Switzerland: Springer.
- Branzei, R., Dimitrov, D. & Tijs, S. (2008). *Models in cooperative game theory* (Vol. 556). Springer Science & Business Media.
- Campbell, D.T. & Fiske, D.W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, 56(2), 81-105.
- Carr, L.T. (1994). The strengths and weaknesses of quantitative and qualitative research: what method for nursing? *Journal of Advanced Nursing*, 20(4), 716-721.
- Chaddad, F. R., Cook, M. L., & Heckelei, T. (2005). Testing for the presence of financial constraints in US agricultural cooperatives: an investment behaviour approach. *Journal of Agricultural Economics*, 56(3), 385-397.
- Charnes, A., Cooper, W.W. & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research*, 2(6), 429-444.
- Chibanda, M., Ortmann, G. F., & Lyne, M. C. (2009). Institutional and governance factors influencing the performance of selected smallholder agricultural cooperatives in KwaZulu-Natal. *Agrekon*, 48(3), 293-315.
- Coelli, T., Rahman, S., & Thirtle, C. (2002). Technical, allocative, cost and scale efficiencies in Bangladesh rice cultivation: a non-parametric approach. *Journal of Agricultural Economics*, 53(3), 607-626.

- Coelli, T.J. & Rao, D.S. (2005). *Total factor productivity growth in agriculture: a Malmquist index analysis of 93 countries, 1980-2000*. *Agricultural Economics*, 32(1), 115-134.
- Cook, M.L. (1994). The role of management behaviour in agricultural cooperatives. *Journal of Agricultural Cooperation*, 9, 42-58.
- Cook, M.L. (1995). The future of US agricultural cooperatives: A neo-institutional approach. *American Journal of Agricultural Economics*, 77(5), 1153-1159.
- Cook, M.L. & Burrell, M.J. (2009). *A cooperative life cycle framework*. Draft paper submitted to the University of Missouri, Columbia.
- Cook, M.L. & Chaddad, F.R. (2004). Redesigning cooperative boundaries: The emergence of new models. *American Journal of Agricultural Economics*, 86(5), 1249-1253.
- Cook, M.L., Chaddad, F.R. & Iliopoulos, C. (2004). *Advances in cooperative theory since 1990: A review of agricultural economics literature*. Erasmus University Rotterdam, Rotterdam School of Management.
- Cordero, J.M., Santín, D., & Sicilia, G. (2013). *Dealing with the endogeneity problem in data envelopment analysis*. MPRA Paper No. 47475, posted 08 Jun 2013.
- Corner, J. (1991). In search of more complete answers to research questions. Quantitative versus qualitative research methods: is there a way forward? *Journal of Advanced Nursing*, 16(6), 718-727.
- Cullinane, K., Wang, T., Song, D. & Ji, P. (2006). The technical efficiency of container ports: comparing data envelopment analysis and stochastic frontier analysis. *Transportation Research Part A*, 40, 354-474.
- Cummins, J.D. & Zi, H. (1998). Comparison of frontier efficiency methods: An application to the U.S. life insurance industry. *Journal of Productivity Analysis*, 10, 131-152.
- Debertin, D.L. (2012). *Agricultural production economics* (2nd edition). Department of Agricultural Economics. University of Kentucky.
- Debreu, G. (1951). The coefficient of resource utilization. *Econometrica: Journal of the Econometric Society*, 19(3), 273-292.
- Demsetz, H. (1988). *A framework for the study of ownership: Ownership, control, and the firm* (Vol. 1), pp. 2-27. Oxford: Blackwell.

Department of Trade and Industry. *Economic Empowerment: Policy, legislation & strategy*. http://www.dti.gov.za/economic_empowerment/co_ops_policy_legis.jsp Accessed: 07 February 2016.

Department of Agriculture, Forestry and Fisheries (DAFF). (2012). *A report on the Agricultural Cooperatives Indaba*. Pretoria: Government Printer.

Department of Agriculture, Forestry and Fisheries (DAFF). (2015). *The 5th annual report of the status of cooperatives in the sector 2015/16*. Pretoria: Government Printer.

Department of Trade and Industry (DTI). (2004). *Cooperative development policy for South Africa*. Pretoria: Government Printer.

Department of Trade and Industry (DTI). (2005). *Cooperative Act 14 of 2005*. Pretoria: Government Printer.

Department of Trade and Industry (DTI). (2012). *The DTI Integrated Strategy on the development and promotion of cooperatives: promoting an integrated cooperative sector in South Africa 2012-2022*. Pretoria: Government Printer.

Doebeli, M., & Hauert, C. (2005). Models of cooperation based on the Prisoner's Dilemma and the Snowdrift game. *Ecology Letters*, 8(7), 748-766.

Doyon, M. (2002). An overview of the evolution of agricultural cooperatives in Quebec. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie*, 50(4), 497-509.

Dyllic, T., & Hockerts, K. (2002). *The Centre for the Management of Environmental Resources*. Working Papers CMER.

Efron, B. (1981). Censored data and the bootstrap. *Journal of the American Statistical Association*, 76(374), 312-319.

Efron, B. & Tibshirani, R.J. (1998). *An introduction to the bootstrap*. Monograph on statistics and applied probability. Chapman & Hall/ CRC. Washington DC.

Eilers, C., & Hanf, C. H. (1999). Contracts between farmers and farmers' processing cooperatives: A principal-agent approach for the potato starch industry. In *Vertical relationships and coordination in the food system* (pp. 267-284). Physica-Verlag HD

Emelianoff, I.V. (1942). *Economic theory of cooperation*. Edwards Brothers Incorporated. Michigan.

- Enke, S. (1945). Consumer coöperatives and economic efficiency. *The American Economic Review*, 148-155.
- Färe, R. & Lovell, C.K. (1978). Measuring the technical efficiency of production. *Journal of Economic Theory*, 19(1), 150-162.
- Farrell, M.J. (1957). The measurement of productive efficiency. *Journal of Royal Statistical Society*, 120(3), 253-290.
- Førsund, F.R., Lovell, C.K. & Schmidt, P. (1980). A survey of frontier production functions and of their relationship to efficiency measurement. *Journal of Econometrics*, 13(1), 5-25.
- Fukuyama, H., Guerra, R., & Weber, W.L. (1999). Efficiency and ownership: evidence from Japanese credit cooperatives. *Journal of Economics and Business*, 51(6), 473-487.
- Grant, R.M. (2014). Towards a knowledge-based theory of a firm. *Strategic Management Journal*, 17(S2), 109-122.
- Hambrusch, J., Kirner, L., & Ortner, K.M. (2006, April). Technical and scale efficiency in Austrian dairy farming. In *Economic Science for Rural Development Conference Proceedings* (No. 10).
- Harris, A., Stefanson, B., & Fulton, M.E. (1996). New generation cooperatives and cooperative theory. *Journal of cooperatives*, 11(1142-2016-92720), 15.
- Heal, G. (1998). Interpreting sustainability. In *Sustainability: Dynamics and Uncertainty* (pp. 3-22). Springer, Dordrecht.
- Helmberger, P. & Hoos, S. (1962). Cooperative enterprise and organisation theory. *Journal of Farm Economics*, 44, 275-290.
- Hjalmarsson, L., Kumbhakar, S.C., & Heshmati, A. (1996). DEA, DFA and SFA: a comparison. *Journal of Productivity Analysis*, 7(2-3), 303-327.
- Jervis, R. (1988). Realism, game theory, and cooperation. *World Politics*, 40(3), 317-349.
- Koopmans, T.C. (1951). Efficient allocation of resources. *Econometrica: Journal of the Econometric Society*, 19(4), 455-465.
- Kumbhakar, S.C. & Lovell, C.A.K. (2000). *Stochastic Frontier Analysis*. Cambridge University Press. New York.
- Lewellen, J. (2002). *Predicting returns with financial ratios*. Working paper 4374-02. MIT Sloan School of Management.

- Lien, G., Hardaker, J.B., & Flaten, O. (2007). Risk and economic sustainability of crop farming systems. *Agricultural systems*, 94(2), 541-552.
- Liu, J.S., Lu, L.L.Y., Lu, W.M. & Lin, B.J.Y. (2013). A survey of DEA applications. *Omega International Journal of Management Sciences*, 41(5), 893-902.
- Lopez, A., & Marcuello, C. (2006). Agricultural cooperative and economic efficiency. *New Medit*, 5(3), 16.
- Lovell, C.A.K. (1994). Linear programming approaches to the measurement and analysis of productive efficiency. Department of Economics, University of Georgia. 2(2), 175-248.
- Manzi, T., Lucas, K., Jones, T.L. & Allen, J. (2010). *Social sustainability in urban areas*. Washington DC: Earthscan.
- Marwa, N. & Aziakpono, M. (2016). Technical and scale efficiency of Tanzanian saving and credit cooperatives. *The Journal of Developing Areas*, 50(1), 29-46.
- Marwa, W.N. (2015). *Efficiency and sustainability of Tanzanian saving and credit cooperatives*. PhD Dissertation submitted to the University of Stellenbosch.
- Marwa, W.N. & Aziakpono, M. (2015). Financial sustainability of Tanzanian saving and credit cooperatives. *International Journal of Social Economics*, 42(10), 870-887.
- Meeusen, W. & van den Broeck, J. (1977). Efficiency estimation from Cobb-Douglas production functions with composed error. *International Economic Review*, 18(2), 435-444.
- Moffat, B.D. (2008). *Efficiency and productivity in Botswana's financial institutions*. PhD thesis submitted to the University of Wollongong.
- Morduch, J. (2005). Smart subsidy for sustainable microfinance. *Finance for the Poor*, 6(4), 1-13.
- Murillo-Zamorano, L.R. (2004). Economic efficiency and frontier techniques. *Journal of Economic Surveys*, 18(1), 33-77.
- Muriu, P.W. (2011). *Microfinance profitability*. PhD thesis submitted to the University of Birmingham.
- Nash, J. (1951). Non-cooperative games. *Annals of Mathematics*, 286-295.
- National Department of Agriculture. (2003). *AgriBEE: Broad Based Economic Empowerment Framework for Agriculture*. Pretoria: Government Printer

- Neyman, A. (1985). Bounded complexity justifies cooperation in the finitely repeated prisoners' dilemma. *Economics letters*, 19(3), 227-229.
- Nigrini, M. (2001). Empowering poor rural villages through the provision of financial services by means of financial service cooperatives: A preliminary investigation into Financial Service Cooperatives in South Africa. In *International Jubilee Conference of the Economic Society of South Africa* (pp. 13-14).
- Olesen, O.B., & Petersen, N.C. (2016). Stochastic data envelopment analysis—A review. *European Journal of Operational Research*, 251(1), 2-21.
- Orme, C., & Smith, P. (1996). The potential for endogeneity bias in data envelopment analysis. *Journal of the Operational Research Society*, 47(1), 73-83.
- Ortmann, G.F. & King, R.P. (2007). Agricultural cooperatives I: history, theory and problems. *Agricultural Economics Research, Policy and Practice in Southern Africa*, 46(1), 18-46.
- Paradi, J.C. & Zhu, H. (2013). A survey on bank branch efficiency and performance research with data envelopment analysis. *Omega*, 41(1), 61-79.
- Phillips, R. (1953). Economic nature of the cooperative association. *Journal of Farm Economics*, 35(1), 74-87.
- Rahman, S., & Awerije, B.O. (2015). Technical and scale efficiency of cassava production system in Delta State, Nigeria: an application of Two-Stage DEA approach. *Journal of Agriculture and Rural Development in the Tropics and Subtropics (JARTS)*, 116(1), 59-69.
- Republic of South Africa. (1994). *White Paper on Reconstruction and Development*. Cape Town: Parliament of the Republic of South Africa.
- Ritzberger, K. (2002). Foundations of non-cooperative game theory. *OUP Catalogue*. Oxford University. England.
- Ruben, R., & Heras, J. (2012). Social capital, governance and performance of Ethiopian coffee cooperatives. *Annals of Public and Cooperative Economics*, 83(4), 463-484.
- Schwettmnn, J. (1997). *Cooperatives and employment in Africa*. Occasional Discussion Paper 97-1. International Labour Association (ILO).
- Sergaki, P. & Semos, A. (2006). The Greek Unions of agricultural cooperatives as efficient enterprises. *Agricultural Economics Review*, 7(2), 15.

- Sexton, R.J., & Iskow, J. (1993). What do we know about the economic efficiency of cooperatives: an evaluative survey. *Journal of Agricultural Cooperation*, 8(1141-2016-92584), 15-27.
- Simar, L., & Wilson, P.W. (2000). A general methodology for bootstrapping in non-parametric frontier models. *Journal of applied statistics*, 27(6), 779-802.
- Simar, L., & Wilson, P.W. (2001). Testing restrictions in nonparametric efficiency models. *Communications in Statistics – Simulation and Computation*, 30(1), 159-184.
- Soboh, R.A.M.E. (2009). *Econometric analysis of the performance of cooperatives and investor-owned firms in the European dairy industry*. Thesis submitted for the Doctor of Philosophy at Wageningen University.
- Soboh, R.A.M.E., Oude Lansink, A., Giesen, G. & van Dijk, G. (2009). Performance measurement of the Agricultural Marketing Cooperatives: The gap between theory and Practice. *Review of Agricultural Economics*, 31(3), 446-469.
- Staatz, J. M. (1985). *Game-Theoretic Analysis of Decision Making in Farmer Cooperatives* (No. 1099-2016-89549).
- Staatz, J. M. (1989). *Farmer cooperative theory: recent developments* (No. 1502-2016-130749).
- Staatz, J.M. (1993). The cooperative as a coalition: A game-theoretic approach. *American Journal of Agricultural Cooperatives*, 65(5), 1084-1089.
- Stattman, S.L. & Mol, A.P.J. (2014). Social sustainability of Brazilian biodiesel: the role of agricultural cooperatives. *Geoforum*, 54, 282-294.
- Sykuta, M.E., & Cook, M.L. (2001). A new institutional economics approach to contracts and cooperatives.
- Syrjä, P., Sjögrén, H., & Tuominen, P. (2012). Financial performance and efficiency of consumer co-operatives and limited companies – agency theoretical approach. *Journal of Co-operative Accounting and Reporting*, 1(1), 53.
- Thomas, L., MacMillan, J., McColl, E., Hale, C., & Bond, S. (1995). Comparison of focus group and individual interview methodology in examining patient satisfaction with nursing care. *Social Sciences in Health*, 1(4), 206-220.

Veerakumaran, G. (2007). *Ethiopian cooperative movement: an explorative study*. Ethiopia: Department of Cooperatives: Faculty of Dry Land Agriculture and Natural Resources. Mekelle University.

Zeller, M. & Meyer, R.L. (2002). *The triangle of microfinance. Financial sustainability, outreach and impact*. The International Food Policy Research Institute. Washington DC..

Zeuli, K.A. & Radel, J. (2005). Cooperatives as a community development strategy: Linking theory and practice. *Journal of Regional Analysis and Policy*, 35(1), 43-54.

Zusman, P. (1992). Constitutional selection of collective-choice rules in a cooperative enterprise. *Journal of Economic Behavior & Organization*, 17(3), 353-362.

CHAPTER 4

EFFICIENCY EVALUATION OF AGRICULTURAL COOPERATIVES IN MPUMALANGA: AN EMPIRICAL STUDY USING THE DEA APPROACH

4.1 INTRODUCTION

The role of cooperatives in an economy ranges from fostering inclusive growth to enabling the marginalised to take a significant negotiating position in markets (Helmberger & Hoos, 1962; Ortmann & King, 2007a; DAFF, 2012). Agricultural cooperatives have unique characteristics of reducing poverty, improving food security and generating employment opportunities, and they enjoy flexibility in meeting a wide variety of social and economic human needs (DTI, 2012). In developed economies there is recognition that cooperatives (and agricultural cooperatives) have evolved over time, in the US there has been a shift from non-seeking profit organisations in the 20th century towards them acquiring a business outlook in the 21st century (Hogeland, 2006). In developing economies, the role of agricultural cooperatives has been underpinned by social welfare, and recently there has been a drive to operate them as profitable businesses, create jobs, and contribute towards economic development therefore accelerating inclusive growth (Machete, 1990).

In recognition of such significance, governments across the world have come up with various strategies to mobilise establishment of cooperatives and ensure a conducive environment through creation of legislative frameworks (Ortmann & King, 2007a). The US has the Bill of Rights of US Cooperative Agriculture (Cook, 1995), Japan has the Cooperative Development Plan (Klinedinst, & Sato, 1994). In South Africa, cooperatives are regulated under the Cooperative Act No. 14 of 2005.

Performance evaluation is important in order to sustain agricultural cooperatives as organisations that can integrate communities into the mainstream economy. Through performance measurement, management can identify existing underlying problems and strategise rational decision units, and benchmark with other firms on how to effectively allocate resources (Modi & Mishra, 2011). Efficiency is one dimension of firm's performance, and efficiency evaluation is equally important in the competitive market: firms need to identify the best means to allocate resources without wastages, and by using resources efficiently, firms can optimise output (Sexton & Iskow, 1993; Guzmán & Arcas, 2008). Efficiency strengthens the firm's capacity to face changing marketing conditions, increasing input costs and economic hardships (Guesmi, 2013). Existing empirical studies

on cooperative performance have yielded differing results. Some studies have demonstrated that agricultural cooperatives have been efficient and achieved successful integration into the economy (Stattman & Mol, 2013; Prakash, 2000), including studies done in Finland (Syrjä, Sjögrön & Tuominen, 2012), Korea (Yoo, Buccola & Gopinath, 2013) and Tanzania (Marwa & Aziakpono, 2015). Success in these economies has been attributed to good governance, and institutional characteristics including efficiency, capital structure and size (Yoo et al., 2013; Amerdorffer, Buchenrieder, Bokusheva & Wolz, 2013). However, success has not yet been widely witnessed in countries such as Portugal, where agricultural cooperatives (except milk-based cooperatives) have been losing market share (Cabo & Rebelo, 2005). In Spain, López and Marcuello (2006) noted that even though other performance indicators of cooperatives are doing well, efficiency was worrisome. Failure of cooperatives has been attributed to mismanagement and inefficiencies (Mude, 2006; Nilsson, Svendsen & Svendsen, 2012).

The performance of agricultural cooperatives in South Africa has also been concerning: there is a high mortality rate post-registration, there has not been significant progress in ensuring that cooperatives are self-reliant, efficient and self-sustaining, and declines in revenue are attributed to inefficiencies and lack of strategy (DTI, 2012; Machete, 1990; Sergaki & Semos, 2006; Ortmann & King, 2007b).

The purpose of this study is to measure the efficiency of existing agricultural cooperatives in Mpumalanga, South Africa. In this study, technical efficiency (TE) is a dimension of pure technical efficiency (PTE) and scale efficiency (SE). The measurement of how a Decision-Making Unit (DMU) is able to utilise a number of inputs or managerial capabilities to minimise wastage in production will be done under the PTE dimension, while an indication of whether the DMU is operating at an optimum scale will be done under SE.

4.2 LITERATURE REVIEW

Theory of cooperatives has evolved over time, from classical theory to the new institutional economic theory. From a classical definition, cooperatives are seen as a group of individual firms, which agree to mutually set up a plant, therefore they should be defined as 'cooperating firms' as opposed to 'cooperative firm' (Phillips, 1953). Enke (1945) affirms that cooperatives behave in the same way as firms acting as independent enterprises. Helmberger (1964) posited that cooperatives operate in a world of imperfect competition, therefore disadvantaging them in competing in the market, with the changing economic and social environments. Abrahamsen (1966) contradicts Helmberger, arguing that

cooperatives tend to adjust to new conditions and are innovators in their own right, with leadership having a role to play in planning business ventures that meet economic needs. The recent theory on cooperatives has extended it to the neo-classical definition, where cooperatives are seen as autonomous associations of persons united to meet their social, economic and cultural goals through a jointly-owned and democratically-controlled enterprise (Veerakumaran, 2007).

The new institutional economics (NIE) emerged in the 1980s, when decision-making was more prominent, and there was a push to better define property rights (Cook & Chaddad, 2004). Under NIE, organisational structure, which is informed by property rights allocations, incentives and performance measures, drives the incentives of the contracting parties, which implies that firms' cooperative contractors may be able to design contracts that promote economic efficiency (Sykuta & Cook, 2001).

Ortmann and King (2007a) hold that the transaction costs analysis, agency theory and property rights analysis collectively focus on institutions and institutional constraints rather than on profit maximisation. Agricultural cooperatives' contracts utilise principal agent theory: the manager acts as principal agent and offers a contract to a farmer who also acts as an agent and offers a contract to a cooperative (Eilers & Hanf, 1999).

To sum up NIE: agency theory, transaction cost economics and property rights theory are determinants in the behaviour of a firm or cooperative (Cook & Chaddad, 2004; Ortmann & King, 2007a).

4.2.1 Cooperative behavioural patterns

Soboh, Oude Lansink, Giesen and van Dijk (2009) elaborated on the theory of agricultural cooperatives, linking them to behavioural patterns. They argued that cooperatives are not easily defined, as they do not have a standard ownership structure, and categorised them as follows.

Independent enterprises: a cooperative is an independent firm with a single objective: to maximise benefits for the members. Optimal prices and quantities are determined by setting the cooperative's marginal cost equal to the marginal revenue, therefore profit becomes the main performance indicator.

Vertical integration: Producers join together in a vertically integrated entity to secure the output flow in the downstream stage of the supply chain and to achieve optimal returns for farmer-members (Emelianoff, 1942 as cited by Soboh et al., 2009).

Coalition of firms: cooperatives have multiple objectives which could overlap, however the functions and benefits are of a coalition. 'Joint' benefits and 'joint' risk-sharing help to achieve economies of size by minimising costs and maximising growth opportunities (Soboh et al., 2009).

In South Africa the Cooperative Act (No. 14 of 2005) defines an agricultural cooperative as "a co-operative that produces, processes or markets agricultural products and supplies agricultural inputs and services to its members". In this study this definition applies, and is linked to the theory of firms, which is premised on profit maximisation, noting the definition's emphasis on the value chain, on producing and marketing the products to and for its members (profit driven). In recognition that cooperative members come together with a common vision, the theory of cooperatives as a coalition also applies, noting that cooperative formation in South Africa requires that individual members who have a common goal of meeting their economic and social needs form a grouping to advance their economic benefit.

4.3 THEORETICAL LITERATURE REVIEW ON EFFICIENCY MEASUREMENT

Efficiency can be measured in various dimensions: technical efficiency (TE), scale efficiency (SE) and economic efficiency (EE). TE is defined as proficiency in which inputs to the production process are converted to the output of the process. Farrell's definition of TE relative to the best-observed practice in a comparison group (Farrell, 1957) is estimated by measuring the reference point's distance to the constant returns-to-scale frontier and the inefficient firm's distance from the same frontier (Marwa & Aziakpono, 2016). EE refers to the proficiency with which producers achieve their economic objective, such as production at minimum cost and generation of maximum revenue (Lovell, 1994). He (Lovell, 1994) emphasised that EE has a component of TE (Lovell, 1994).

This study adopted the technical efficiency method. Debreu (1951) stated that a firm is only technically efficient if it operates on the frontier and all associated slacks are zero (Debreu, 1951).

PTE and SE can be decomposed within TE. PTE measures how far a firm is away from the production frontier under conditions of Variable Returns to Scale (VRS) and is measured as the ratio of the distance between inefficient points to the VRS efficient frontier (Ji & Lee, 2010; Marwa & Aziakpono, 2016). SE is relative to size (Banker, Charnes & Cooper, 1984) and measures the constant returns to scale (CRS) and VRS.

CRS is appropriate when all firms are operating at an optimal scale, and SE for each DMU can be obtained by testing for both CRS and VRS through Data Envelopment Analysis (DEA), and then decomposing the TE scores from CRS into two components: due to SE, and due to 'pure' PTE (Charnes, Cooper & Rhodes (CCR), 1978).

Literature presents various methods of measuring efficiency and TE: however, frontier estimation models such as Stochastic Frontier Analysis (SFA) and DEA generally dominate (Marwa & Aziakpono, 2016).

Stochastic Frontier Analysis is a parametric approach which can estimate the productivity and efficiency of a DMU. SFA was developed on theoretical literature of productive efficiency (Meeusen & van den Broeck, 1977; Aigner, Lovell & Schmidt., 1977), and resulted in developing the production frontier context (Kumbhakar & Lovell, 2000). SFA creates a framework that can analyse firms that do not succeed in optimisation, or are not fully efficient, by comparing firms to 'best practice' (Cummins, Feng & Weiss, 2012).

The SFA model introduces two error components – a random error term and an inefficiency term – and integrates two unobserved error terms representing inefficiency and statistical noise. The best the model can do is to obtain an estimate of 'mean' efficiency over the sample (Andor & Hesse, 2011; Behr, 2015).

Data Envelopment Analysis is a statistical procedure that has certain properties that hold under relatively mild assumptions regarding the underlying populations from which the data is obtained. The CCR model – a managerial and performance measurement tool – is an efficiency measurement which generalises the single output and single input ratio to multiple inputs and outputs without requiring pre-assigned weights (Charnes et al., 1978). DEA deals with individual DMUs as opposed to the population average: it utilises n optimisation for each DMU, which makes DEA results more reliable (Moffat, 2008).

Charnes et al. (1978) applied the model for efficiency measurement in DMUs, where a DMU could be a firm or an agency: the methodology emerged as an alternative to the traditional regression method analysis. The units that lie in the 'surface' are defined as 'efficient' DMUs (Murillo-Zamorano, 2004). Within the input-oriented model, DEA defines the frontier by seeking the maximum possible proportional reduction in input levels, while in the output-oriented model it seeks the maximum proportional increase in output production, with input levels held fixed (Coelli & Rao, 2005).

Both approaches have disadvantages. SFA obtains 'mean' efficiency over the sample (Kumbhakar & Lovell, 2000) and functional form misspecification where there is skewness

of the inefficiency distribution, this always results in incorrect estimation due to wrong functional form and multicollinearity (Andor & Hesse, 2011).

The limitation of DEA is its 'non-stochastic' nature: inferences drawn may be sensitive to noise in the underlying data, and therefore do not account for statistical noise or white noise (Lovell, 1994; Dyson, Allen, Camanho, Pidinovski, Sarrico & Shale, 2001). Bootstrapping, based on estimating the distribution of statistics based on independent observations (Efron & Tibshirani, 1998; Simar & Wilson, 2000), is usually applied to deal with the limitation of DEA (its deterministic nature).

4.4 EMPIRICAL LITERATURE REVIEW

DEA has been widely used to measure efficiency for agricultural cooperatives, as they are regarded as DMUs. Country studies have investigated the performance of agricultural cooperatives, employing the DEA approach with conclusive results, where efficiency drivers were found not to be homogenous across countries.

Although there are concerns about the inefficiency rates of agricultural cooperatives, utilising resources effectively and efficiently is necessary for successful and efficient cooperatives (Sergaki & Semos, 2006; Yoo et al., 2013; Soboh et al., 2009). However, other factors linked to efficiency can also drive the success of a cooperative.

Russell (2013) investigated US farm and cooperative profitability, using DEA to focus on efficiency of cooperatives and their ability to maximise return on investment and profitability, and found liquidity and solvency ratios as determinants in improving cost efficiency.

Tipi, Yildiz, Nargelecekenler and Cetin (2009) investigated the performance and TE and the determinants of rice farms in Turkey using an input-oriented DEA model to measure TE scores, and Tobit regression: the regression estimates showed TE was negatively influenced by number of farmers, age, plot size and off-farm income.

Soboh, Oude Lansink and van Dijk (2012) compared dairy cooperatives and investor-owned firms in Europe to measure performance, applying DEA to measure efficiency, and found that cooperatives' performance was influenced by members' objectives.

In South Africa, Piesse, Doyer, Thirtle and Vink (2005) investigated the efficiency levels of grain cooperatives in competitive markets using DEA and financial ratios and found that increased competition led to increased efficiency of cooperatives.

Several papers and studies have applied DEA to produce reliable results (Chavas & Aliber, 1993; Thiam, Bravo-Ureta & Rivas, 2001; Coelli, Rahman & Thirtle, 2002). Hjalmarsson, Kumbhakar and Heshmati (1996) compared SFA, Deterministic Parametric Frontier (DFA) and DEA in TE measurement comparisons in the Colombian cement industry for the period 1968-1988 and found that all three models allowed variable returns to scale, but DEA generated a large range of optimal scale levels (Hjalmarsson et al., 1996). Liu, Lu, Lu and Lin (2013) found that DEA was more robust in measuring efficiency than parametric approaches.

This paper then positions the study to adopt DEA as the measure, as it has been widely used in agriculture, and the application has produced reliable results.

4.5 METHODOLOGY

The objective of this study was to measure and analyse TE (and SE) of agricultural cooperatives and determine the drivers of efficiency among 19 agricultural cooperatives in Mpumalanga. DEA was used to measure the efficiency of cooperatives using the frontier function approach model and the input-output based model.

4.5.1 Frontier function approach

The frontier methodology technique presents the benchmarking model between DMUs: it measures how a DMU is performing relative to its peers. Frontiers are important for the prediction of technical inefficiencies in industry (Batesse & Coelli, 1991). It is widely used in agriculture due to its consistency in production, profit and cost functions, with the notion of input orientation, minimising input or output orientation, or maximising profit (Bravo-Ureta & Pinheiro, 1993).

4.5.2 Input-output based model

Within the input-oriented model, DEA defines the frontier by seeking the maximum possible proportional reduction in input levels, while in the output model it seeks the maximum proportional increase in output production, with input levels held fixed (Coelli & Rao, 2005). In agriculture the input-output based model is chosen, as adopted in the theory of the firm, the objective being input minimisation and profit maximisation without allocating further resources (Farrell, 1957; Helmberger & Hoos, 1962).

TE was deduced using the input minimisation orientation as in the mathematical formulation by Coelli, Rao, O'Donnell and Battese (2005) – see Equation (4.1):

$$\begin{aligned} & \text{Min } \theta, \\ & \theta, \lambda \\ & \text{subject to } -q_i + Q\lambda \geq 0, \\ & \theta x_i - X\lambda \geq 0, \\ & \lambda \geq 0 \end{aligned} \tag{4.1}$$

where θ is a scalar and λ is a $I \times 1$ vector of constants. The value θ obtained is the efficiency score for the i th firm and satisfies $0 \leq \theta \leq 1$. The value 1 indicates a firm lying on the frontier and therefore the firm is known to be technically efficient, according to Farrell's (1957) definition.

TE values between 0 and 1 with smaller ratios depict greater inefficiency. DMUs are connected by a continuous locum to form an efficient frontier (Marwa & Aziakpono, 2016).

4.5.3 Input and output variables

Among the selected 19 agricultural cooperatives, there was no prescribed formula for presenting annual financial statements (AFS), however four variables were common among all the cooperatives: assets, expenditure, revenue and profit, and these were adopted as the four variables to be used as inputs and outputs.

Assets are inputs that can be used to generate income, from the accounting principle that assets can generate revenue for the firm (Klein, 1971). Expenses are used as inputs as expense management is one of the determinants of profitability (Sufian & Chong, 2008). Revenue and profits are used as outputs: although one can argue that one is a subset of the other, revenue can grow faster and lead to a firm's high profitability, however a firm can have high revenue and record low profits, whilst another firm can have low revenue and high profits. Generally, management's ability to control costs will be reflected in the profit and loss accounts (Guru, Staunton & Balashanmugam, 2002).

Expenses can be linked to profits, as the gross revenue is divided into expenses and profits: business profit is the difference between the reported revenue and reported expenses (De Mel, McKenzie & Woodruff, 2009). Liang, Cook and Zhu (2008) used assets as inputs and profits and revenue as outputs using the DEA in a two-stage efficiency composition.

4.5.4 Data sources

This study used data from the DAFF's 2015/16 Annual Report on cooperatives. South Africa had a total of 2,682 agricultural cooperatives, of which 571 were in Mpumalanga. According to DAFF 121 cooperatives complied with reporting on their AFS in the financial year 2014/15, and in 2015/16, 194 cooperatives complied. However, when the study was conducted, it was found that not all the 194 cooperatives had audited financial statements: only 19 cooperatives could provide their AFS. The study selected 19 agricultural cooperatives that had complied with AFS reporting for 2015/16. The data was available from the Mpumalanga Department of Agriculture, and permission was sought to use the data for preliminary study.

4.6 RESULTS AND DISCUSSIONS

First, the descriptive statistics of inputs and outputs to DMUs in the sample are presented and discussed, followed by the results found after conducting DEA.

4.6.1 Descriptive statistics

It is apparent from Table 4.1 that the standard deviation values vary greatly for both outputs and inputs. This is attributable to the difference in size between the agriculture cooperatives in the study sample. The minimum values indicate that there are very small cooperatives in the sample, with some not making profits, while the standard deviation indicates a huge variation of inputs (total assets and total expenses) and outputs (revenue and profit).

Table 4.1: Summary statistics of input and output variables (figures in South African rand: 1 Rand ZAR = USD 0.060)

Variable	Mean	St. Dev	Min	Max
Revenue	810,792.10	887,848.10	2,000.00	2,817,903.00
Profit	63,715.47	71,587.78	-	184,134.00
Total Assets	483,853.80	573,094.90	2,000.00	1,643,619.00
Total Expenses	796,383.60	863,563.80	1,500.00	2,819,297.00

Source: Author's computations

The efficiency scores (TE and SE) were estimated for each agriculture cooperative. The most favourable situation is to have efficiency scores that are as close as possible or equal to one, meaning the DMU is efficient enough, with DMUs minimising inputs while

achieving the desired output (Charnes & Cooper, 1984), whereas constant returns to scale will be the optimal position as the DMU will not desire to go under or reduce scale. A DMU is regarded as technically efficient if it is using minimum production inputs to produce as much output as other DMUs in the same industry (Coelli et al., 2005).

To better identify the sources of efficiency or inefficiency the TE can be decomposed into PTE and SE: $PE = PTE * SE$. The reason for decomposing TE is to be able to demonstrate other efficiency levels: pure technical efficiency, scale efficiency and the nature of returns to scale (Avrikan, 2004). Pure technical efficiency will measure input allocation and wastage thereof, and scale efficiency demonstrates returns on size (Sahoo, Zhu & Tone & Klemen, 2014)

In most instances after running the DEA model we get only TE and SE, so we calculate $PTE = TE/SE$. PTE measures how efficiently the DMU is able to utilise its inputs to produce outputs (managerial ability to minimise wastages in production). Whilst SE is an indication of whether the DMU is operating at an optimal scale, returns to scale (RTS) are used to determine if the agriculture cooperative has been running at full optimum scale relative to its size with CRS being at optimal level or most productive scale size (Marwa & Aziakpono, 2016), or if they have been able to minimise outputs whilst achieving the desired outputs, meaning they are at increasing returns to scale (IRS), or decreasing returns to scale (DRS) where the cooperative has to reduce its size to achieve optimum scale (Banker & Thrall, 1992).

Table 4.2 gives a summary of the results from the 19 cooperatives using the DEA Program developed by Coelli (1996).

Table 4.2: Summary of results using DEA (DEAP version 2.1)

DMU #	Technical Efficiency	Pure Technical Efficiency	Scale Efficiency	Returns to Scale
1	0.501	0.502	0.999	-
2	0.516	0.519	0.994	IRS
3	0.670	1.000	0.670	DRS
4	0.598	0.697	0.858	DRS
5	0.691	1.000	0.691	DRS
6	0.687	1.000	0.687	IRS
7	0.694	0.835	0.831	DRS
8	1.000	1.000	1.000	-

9	0.675	1.000	0.675	DRS
10	1.000	1.000	1.000	-
11	0.945	0.969	0.975	DRS
12	0.192	0.322	0.597	DRS
13	1.000	1.000	1.000	-
14	0.574	0.575	0.999	IRS
15	0.667	0.696	0.959	DRS
16	0.746	0.750	0.995	IRS
17	1.000	1.000	1.000	-
18	0.769	0.952	0.808	DRS
19	0.671	0.865	0.776	DRS
Mean	0.716	0.825	0.869	

Table 4.3 shows the RTS results which will be further elaborated under 4.6.2.1 and 4.6.2.2.

Table 4.3: DMUs on Returns to Scale

	CRS	IRS	DRS
DMUs	5	4	10
Percentage	26%	21%	53%

4.6.2 Narrative results

4.6.2.1 Technical efficiency

On TE mean efficiency the DMUs were 72% efficient, meaning 28% inefficient or wastages. Only five of the DMUs (DMUs 1, 8, 10, 13 and 17) were technically efficient with no wastages, and those DMUs were operating at an optimal scale, at CRS. Of the remainder, 14 were found to be technically inefficient. DMU 11 was closest to 1.00, just shy of being 100% efficient. The TE results indicate a need for agricultural cooperatives to efficiently manage or allocate their resources.

4.6.2.2 Scale efficiency

With regard to SE, the cooperatives are operating at 87%. This implies that the DMUs are 13% inefficient in terms of scale: the cooperatives should revisit their operations to avoid further loss, and may have to reduce their size so that they are at 100% in terms of SE.

Four DMUs (8, 10, 13, 17) were at 100% TE and at 100% SE (or CRS), indicating a correlation between efficiency levels and size of the cooperative: this implies that only 21% of the agricultural cooperatives were technically efficient and operating at optimum scale. Ten of the DMUs (3, 4, 5, 7, 9, 11, 12, 15, 18 and 19) were operating at DRS: these DMUs are too big for their operations and should reduce their operations to avoid further economic loss. Only four of the DMUs (2, 6, 14 and 16) were found to be operating at IRS, meaning they are able to reduce inputs whilst achieving the desired outputs.

These results indicate that the size or scale of the operations of the firm matters, which was evident in the findings of Yoo et al. (2013) who noted that the size of the cooperatives affected efficiency levels. Smaller cooperatives were more inefficient. Yoo et al. (2013) argued that the skills by which management combine available inputs to produce outputs in line with the cooperatives' objectives is of utmost importance in achieving efficiency. Sergaki and Semos (2006) noted that cooperatives in Greece are struggling due to inefficiencies, where smaller cooperatives were found to suffer with no economies of scale, resulting in high production costs and affecting efficiency levels.

4.7 CONCLUSION

This study investigated efficiency levels of agricultural cooperatives, which were treated as DMUs. Of the agricultural cooperatives that were compliant with reporting on their Annual Financial Statements in the year 2015/16, 19 cooperatives were selected. From the mean efficiency scores, the cooperatives were 72% efficient on TE, meaning 28% inefficiency levels. The results presented are consistent with the findings of Machete (1990) and Ortmann and King (2007b). An average of 26% were operating at CRS, with 21% at IRS and 53% at DRS. The 21% of the agricultural cooperatives who were at CRS were the same cooperatives that were 100% technically efficient, implying that the size of the cooperative matters (Yoo et al., 2013, Sergaki & Semos, 2006).

Cooperative members need to consider focusing on scale, to better improve technical efficiency, in this regard they should consider joining resources with other smaller cooperatives to form secondary cooperatives, this will increase scale and improve their efficiency levels. With regard to policy implications, there should be focus and support to consider the scale of operations of the agricultural cooperatives in terms of better management of resource allocation. Government should consider subsidising the non-performing cooperatives, however with a clear exit strategy, where possible empowering them on optimal resource allocation, rather than a blanket support approach. There is also

a need to explore mechanisms by which the cooperatives can provide security in the form of risk sharing, this can be facilitated by encouraging members to raise equity when forming a cooperative.

The sample selected only 19 DMUs: a larger sample would provide a better understanding of the efficiency levels of agricultural cooperatives in Mpumalanga.

4.8 REFERENCES

- Abrahamsen, M.A. (1966). Discussion: Government regulations and market performance. Problems in research, and future roles for agricultural cooperatives. *Journal of Farm Economics*, 48(5), 1439-1443.
- Aigner, D., Lovell, C.K. & Schmidt, P. (1977). Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics*, 6(1), 21-37.
- Amerdorffer, F., Buchenrieder, G., Bokusheva, R. & Wolz, A. (2013). Efficiency in microfinance: financial and social performance of agricultural credit cooperatives in Bulgaria. *Journal of the Operational Research Society*, 66, 57-65.
- Andor, M. & Hesse, F. (2011). *A Monte Carlo simulation comparing DEA, SFA and two simple approaches to combine efficiency estimates*. Discussion paper no. 51. Centre of Applied Economic Research, University of Munster.
- Avkiran, N. K. (2004). Decomposing technical efficiency and window analysis. *Studies in Economics and Finance*, 22(1), 61-91.
- Banker, R.D., Charnes, A. & Cooper, W.W. (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis. *Management Science*, 30(9), 1078-1092.
- Banker, R.D. & Thrall, R.M. (1992). Estimation of returns to scale using data envelopment analysis. *European Journal of Operational Research*, 62(1), 74-84.
- Batesse, G.E. & Coelli, T.J. (1991). Frontier production functions, technical efficiency and panel data: with applications to paddy farmers in India. In Gullledge, T.R. & Knox Lovell, C.A. (Eds.), *International Applications of Productivity and Efficiency Analysis*, pp. 149-165. Netherlands: Springer.
- Behr, A. (2015). Stochastic Frontier Analysis. In *Productivity and efficiency analysis with R* (pp. 183-201). Cham, Switzerland: Springer.
- Bravo-Ureta, B.E. & Pinheiro, A.E. (1993). Efficiency analysis of developing country agriculture: a review of the frontier function literature. *Agricultural and Resource Economics Review*, 22(1), 88-101.
- Cabo, P. & Rebelo, J. (2005). Why do agricultural cooperatives merge? The Portuguese experience. *Annals of Public and Cooperative Economics*, 76(3), 491-516.

- Charnes, A., Cooper, W.W. & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research*, 2(6), 429-444.
- Charnes, A. & Cooper, W.W. (1984). Preface to topics in data envelopment analysis. *Annals of Operations Research*, 2(1), 59-94.
- Chavas, J.-P. & Aliber, M. (1993). An analysis of economic efficiency in agriculture: a nonparametric approach. *Journal of Agricultural and Resource Economics*, 18(1), 1-16.
- Coelli, T. (1996). *A guide to DEAP version 2.1: a data envelopment analysis (computer) program*. Centre for Efficiency and Productivity Analysis, University of New England. New South Wales.
- Coelli, T., Rahman, S. & Thirtle, C. (2002). Technical, allocative, cost and scale efficiencies in Bangladesh rice cultivation: a non-parametric approach. *Journal of Agricultural Economics*, 53(3), 607-626.
- Coelli, T.J. & Rao, D.S. (2005). *Total factor productivity growth in agriculture: a Malmquist index analysis of 93 countries, 1980-2000*. *Agricultural Economics*, 32(1), 115-134.
- Coelli, T.J., Rao, D.S.P., O'Donnell, C.J. & Battese, G.E. (2005). *An introduction to efficiency and productivity analysis*. New York: Springer Science + Business Media.
- Cook, M.L. (1995). The future of US agricultural cooperatives: A neo-institutional approach. *American Journal of Agricultural Economics*, 77(5), 1153-1159.
- Cook, M.L. & Chaddad, F.R. (2004). Redesigning cooperative boundaries: the emergence of new models. *American Journal of Agricultural Economics*, 86(5), 1249-1253.
- Cummins, J.D., Feng, Z. & Weiss, M.A. (2012). *Reinsurance counterparty relationships and firm performance in the US property-liability insurance industry*. Draft paper submitted to Temple University.
- De Mel, S., McKenzie, D.J. & Woodruff, C. (2009). Measuring microenterprise profits: Must we ask how the sausage is made? *Journal of Development Economics*, 88(1), 19-31.
- Debreu, G. (1951). The coefficient of resource utilization. *Econometrica*, 19(3), 273-292.
- Department of Agriculture, Forestry and Fisheries (DAFF). (2012). *A report on the Agricultural Cooperatives Indaba*. Pretoria: Government Printer.
- Department of Agriculture, Forestry and Fisheries (DAFF). (2015). *The 5th annual report of the status of cooperatives in the sector 2015/16*. Pretoria: Government Printer.

- Department of Trade and Industry (DTI). (2005). *Cooperative Act 14 of 2005*. Pretoria: Government Printer.
- Department of Trade and Industry (DTI). (2012). *The DTI Integrated Strategy on the development and promotion of cooperatives: promoting an integrated cooperative sector in South Africa 2012-2022*. Pretoria: Government Printer.
- Dyson, R.G., Allen, R., Camanho, A.S., Podinovski, V.V., Sarrico, C.S. & Shale, E.A. (2001). Pitfalls and protocols in DEA. *European Journal of Operational Research*, 132(2), 245-259.
- Efron, B. & Tibshirani, R.J. (1998). *An introduction to the bootstrap. Monograph on statistics and applied probability*. Washington DC: Chapman & Hall/CRC.
- Eilers, C. & Hanf, C.H. (1999). Contracts between farmers and farmers' processing co-operatives: A principal-agent approach for the potato starch industry. In Galizzi, G. & Venturini, L. (Eds.), *Vertical relationships and coordination in the food system*, pp. 267-284. Heidelberg: Physica-Verlag HD.
- Enke, S. (1945). Consumer coöperatives and economic efficiency. *American Economic Review*, 35(1), 148-155.
- Farrell, M.J. (1957). The measurement of productive efficiency. *Journal of Royal Statistical Society*, 120(3), 253-290.
- Guesmi, B. (2013). *The productive efficiency in agriculture: recent methodological advances*. Doctoral thesis: Agricultural Economics. Spain: Polytechnic University of Catalonia.
- Guru, B.K., Staunton, J. & Balashanmugam, B. (2002). Determinants of commercial bank profitability in Malaysia. *Journal of Money, Credit and Banking*, 17, 69-82.
- Guzmán, I., & Arcas, N. (2008). The usefulness of accounting information in the measurement of technical efficiency in agricultural cooperatives. *Annals of Public and Cooperative Economics*, 79(1), 107-131.
- Helmberger, P. & Hoos, S. (1962). Cooperative enterprise and organisation theory. *Journal of Farm Economics*, 44, 275-290.
- Helmberger, P.G. (1964). Cooperative enterprise as a structural dimension of farm markets. *Journal of Farm Economics*, 46(3), 603-617.
- Hjalmarsson, L., Kumbhakar, S.C. & Heshmati, A. (1996). DEA, DFA and SFA: a comparison. *Journal of Productivity Analysis*, 7(2), 303-327.

- Hogeland, J.A. (2006). The economic culture of US agricultural cooperatives. *Culture & Agriculture*, 28(2), 67-79.
- Ji, Y. & Lee, C. (2010). Data envelopment analysis. *Stata Journal*, 10(2), 267-280.
- Klein, M.A. (1971). A theory of the banking firm. *Journal of Money, Credit and Banking*, 3(2), 205-218.
- Klinedinst, M. & Sato, H. (1994). The Japanese cooperative sector. *Journal of Economic Issues*, 28(2), 509-517.
- Koopmans, T.C. (Ed.) (1951). *Activity analysis of production and allocation* (No. 13). New York: Wiley.
- Kumbhakar, S.C. & Lovell, C.A.K. (2000). *Stochastic frontier analysis*. Cambridge University Press. New York.
- Liang, L., Cook, W.D. & Zhu, J. (2008). DEA models for two-stage processes: Game approach and efficiency decomposition. *Naval Research Logistics*, 55(7), 643-653.
- Liu, J.S, Lu, L.L.Y., Lu, W.M. & Lin, B.J.Y. (2013). A survey of DEA applications. *International Journal of Management Sciences*, 41, 893-902.
- López, A. & Marcuello, C. (2006). Agricultural cooperatives and economic efficiency. *New Medit*, 5(3), 16-22.
- Lovell, C.A.K. (1994). Linear programming approaches to the measurement and analysis of productive efficiency. *Top*, 2(2), 175-248.
- Machete, C.L. (1990). Factors contributing to poor performance of agricultural cooperatives in less developed areas. *Agrekon*, 29(4), 305-309.
- Marwa, N. & Aziakpono, M. (2016). Technical and scale efficiency of Tanzanian saving and credit cooperatives. *Journal of Developing Areas*, 50(1), 29-46.
- Marwa, W.N. & Aziakpono, M. (2015). Financial sustainability of Tanzanian saving and credit cooperatives. *International Journal of Social Economics*, 42(10), 870-887.
- Meeusen, W. & van den Broeck, J. (1977). Efficiency estimation from Cobb-Douglas production functions with composed error. *International Economic Review*, 18(2), 435-444.
- Modi, S.B. & Mishra, S. (2011). What drives financial performance – resource efficiency or resource slack? Evidence from US based manufacturing firms from 1991 to 2006. *Journal of Operations Management*, 29(3), 254-273.

- Moffat, B.D. (2008). *Efficiency and productivity in Botswana's financial institutions*. PhD thesis submitted to the University of Wollongong.
- Mude, A. (2006). *Weakness in institutional organisation: explaining the dismal performance of Kenya's coffee cooperatives*. Contribution paper presented at the International Association Agricultural Economist Conference, Australia (August 12-18, 2006).
- Murillo-Zamorano, L.R. (2004). Economic efficiency and frontier techniques. *Journal of Economic Surveys*, 18(1), 33-77.
- Nilsson, J., Svendsen, G.L.H. & Svendsen, T.G. (2012). Are large and complex agricultural cooperatives losing their social capital? *Agribusiness International Journal*, 28(2), 187-204.
- Ortmann, G.F. & King, R.P. (2007a). Agricultural cooperatives I: history, theory and problems. *Agrekon*, 46(1), 18-46.
- Ortmann, G.F. & King, R.P. (2007b). Agricultural cooperatives II: can they facilitate access of small-scale farmers in South Africa to input and product markets? *Agrekon*, 46(2), 219-244.
- Phillips, R. (1953). Economic nature of the cooperative association. *Journal of Farm Economics*, 35(1), 74-87.
- Piesse, J., Doyer, T., Thirtle, C. & Vink, N. (2005). The changing role of grain cooperatives in the transition to competitive markets in South Africa. *Journal of Comparative Economics*, 33(1), 197-218.
- Prakash, D. (2000). *Development of agricultural cooperatives: relevance of Japanese experiences to developing countries*. Paper presented at the 14th ICA Japan International Training course on "strengthening management of agricultural cooperatives in Asia", held at IDACA, Japan, 18 April 2000.
- Russell, L.A. (2013). *Cost efficiency and capital structure in farms and cooperatives*. Dissertation submitted in partial fulfilment of the Doctor of Philosophy in Agricultural Economics, Kansas State University.
- Sahoo, B.K., Zhu, J., Tone, K., & Klemen, B.M. (2014). Decomposing technical efficiency and scale elasticity in two-stage network DEA. *European Journal of Operational Research*, 233(3), 584-594.
- Sergaki, P. & Semos, A. (2006). The Greek Unions of agricultural cooperatives as efficient enterprises. *Agricultural Economics Review*, 7(2), 15-27.

- Sexton, R.J., & Iskow, J. (1993). What do we know about the economic efficiency of cooperatives: an evaluative survey. *Journal of Agricultural Cooperation*, 8(1141-2016-92584), 15-27.
- Simar, L. & Wilson, P.W. (2000). Statistical inference in nonparametric frontier models: The state of the art. *Journal of Productivity Analysis*, 13(1), 49-78.
- Soboh, R.A.M.E., Oude Lansink, A., Giesen, G. & van Dijk, G. (2009). Performance measurement of the agricultural marketing cooperatives: the gap between theory and practice. *Review of Agricultural Economics*, 31(3), 446-469.
- Soboh, R., Oude Lansink, A. & van Dijk, G. (2012). *Efficiency of investor owned firms and cooperatives revisited*. European Association of Agricultural Economists (113th Seminar, 3–6 September 2009, Crete, Greece) (No. 58132).
- Stattman, S.L. & Mol, A.P.J. (2013). Social sustainability of Brazilian biodiesel: the role of agricultural cooperatives. *Geoforum*, 54, 282-294.
- Sufian, F. & Chong, R.R. (2008). Determinants of bank profitability in a developing economy: empirical evidence from the Philippines. *Asian Academy of Management Journal of Accounting & Finance*, 4(2), 91-112.
- Sykuta, M.E. & Cook, M.L. (2001). A new institutional economics approach to contracts and cooperatives. *American Journal of Agricultural Economics*, 83(5), 1273-1279.
- Syrjä, P., Sjögrön, H. & Tuominen, P. (2012). Financial performance and efficiency of consumer cooperatives and limited companies – agency theoretical approach. *Journal of Co-Operative Accounting and Reporting*, 1(2), 53-69.
- Thiam, A., Bravo-Ureta, B.E. & Rivas, T.E. (2001). Technical efficiency in developing country agriculture: a meta-analysis. *Agricultural Economics*, 25(2-3), 235-243.
- Tipi, T., Yildiz, N., Nargelecekenler, M. & Cetin, B. (2009). Measuring the technical efficiency and determinants of technical efficiency of rice farms in Marmara region, Turkey. *New Zealand Journal of Crop and Horticultural Science*, 37, 121-129.
- Veerakumaran, G. (2007). *Ethiopian cooperative movement: an explorative study*. Ethiopia: Department of Cooperatives, Faculty of Dry Land Agriculture and Natural Resources, Mekelle University.
- Yoo, C.K., Buccola, S. & Gopinath, M. (2013). Cooperative pricing and scale efficiency: the case of Korean rice processing complexes. *Agricultural Economics*, 44, 309-321.

CHAPTER 5

EFFICIENCY AND PROFITABILITY ANALYSIS OF AGRICULTURAL COOPERATIVES IN MPUMALANGA, SOUTH AFRICA

5.1 INTRODUCTION

Cooperatives are formed as a vehicle of economic development, as members or small producers combine to capture economies of size, and therefore have bargaining power (Lerman & Parliament, 1991). In South Africa agricultural cooperatives are regulated under the Cooperative Act of 2005, and cooperatives are regarded as a vehicle to economic inclusion (Ortmann & King, 2007a). The Act defines an agricultural cooperative as ‘a cooperative that produces processes or markets agricultural products and supplies agricultural inputs and services to its members’. The major role of the Cooperative Act has been to coordinate functions such that cooperatives promote economic and social development through employment creation and generating income (Ortmann & King, 2007a). Since the enactment of the Cooperative Act, there have been concerns over whether the cooperatives are achieving economic and social development goals (Ortmann & King, 2007b; Chibanda, Ortmann & Lyne, 2009).

Performance evaluation is important, as it enables the firm to identify underlying problems, and to benchmark with other firms in the industry (Charnes & Cooper, 1984). Performance analysis is also important as it is considered a significant factor in driving the survival of a firm (Keramidou, Mimis, Fotinopoulou & Tassis, 2013). This study employs performance measurement through efficiency and profitability analysis. The objective of the study is to establish if the cooperatives as organisations are efficient and profitable, and are able to achieve economic gains for its members or patrons. The study also tests the correlation between efficiency and profitability, that is, whether efficient cooperatives are also profitable. Data Envelopment Analysis (DEA) was employed to measure efficiency and Return on Assets (ROA) was used to measure profitability. The study further employed the profitability-efficiency matrix to determine the correlation between profitability and efficiency, separating the best performers from low performers.

5.2 THEORETICAL LITERATURE REVIEW

Cooperative as a Firm (Theory of a Firm): Studies of cooperative behaviour linked to firms have always advanced that agricultural cooperatives seek to minimise costs or inputs with the objective of maximising profits (Helmberger & Hoos, 1962; Aoki, 1984). Helmberger and Hoos used the neo-classical theory of the firm to develop short-run and long-run models of a cooperative, where each firm maximises its profits subject to its cost structure and product demand constraints (Helmberger & Hoos, 1962). However, Emelianoff argued that cooperatives should be viewed as aggregate economic units, with a vertical integration model, where each independent enterprise seeks to maximise profits (Emelianoff, 1995). The extension of this argument is augmented by Phillips, who holds that that cooperatives are vertically integrated firms, as the associated firms must each allocate resources to a common plant (Phillips, 1953). This theory underpins that a single integrated firm maximises profits through inputs from different firms, performing different functions, and yet are brought under single managerial control (Emelianoff, 1995; Helmberger & Hoos, 1962).

However, fundamental problems have been pointed out from the vertical firm theory and profit maximisation objective, citing the agency problem where the objectives of the agent are not the same as that of the principal (Sykuta & Chaddad, 1999). The challenges are horizon problems, as cooperatives are seen to be focusing on short-term earnings rather than long-term earnings and sustainability (Porter & Scully, 1987; Ortmann & King, 2007b). It is also noted that cooperatives not only address the profit maximisation role, but they also need to balance social needs through economic fairness by equal access to markets, which means that over and above profitability the interests of the community become paramount (Schwettmann, 1997). Another argument advanced by Sexton and Iskow (1988) is that performance of a joint entity might be distorted, as different entities each have their own assets and can shift income from one entity to another. Having noted the conflicting measurement gaps, the fundamental objection remains that cooperative members are more concerned about the financial performance of their entity (Hardesty & Salgia, 2003).

Suffice it to say, as much as members are entitled to the net income generated by the cooperative, they are equally residual risk bearers of the firm's net cash flow (Soboh, Oude Lansink, Giesen & van Dijk, 2009). Notwithstanding the above, this study acknowledges the opposing views, however it has adopted the classical theory of a firm, that of cost minimisation and maximising output for profit maximisation, as across various theories, the common goal of profit maximisation is evident, with economic gains for economic

advancement in developing economies. The adoption is also consistent with the theory adopted in the preceding chapter on efficiency measurement, where the classical theory of a firm was adopted, with the objective of cost minimisation and profit maximisation (Helmlinger & Hoos, 1962). This literature review section follows with a look at agricultural cooperatives and efficiency evaluation, and agricultural cooperatives and profitability evaluation.

Agricultural Cooperatives and Efficiency Evaluation: Performance evaluation through efficiency measurement analyses the ability of a firm to produce the maximum output possible given input constraints (Coelli, Rao, O'Donnell & Battese, 2005). According to Koopmans (1951), an input-output vector is technically efficient only if increasing any output or decreasing any input is possible by decreasing some other output or increasing some other input (Koopmans, 1951). This study employs technical efficiency (TE) which measures the performance of a firm using the extent to which it deviates from the best practice frontier given a specific dimension: cost, inputs, output or profit (Marwa & Aziakpono, 2016). A firm is only technically efficient if it operates on the frontier and all associated slacks are zero (Debreu, 1951). Efficiency can be measured with either accounting or economic methods. The accounting principle applies ratios as a measure of efficiency (Charnes & Cooper, 1984; Halkos & Salamouris, 2004). Economic methods present various techniques of measuring efficiency and TE: however, frontier estimation models such as Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA) generally dominate (Marwa & Aziakpono, 2016).

Stochastic Frontier Analysis: SFA is a parametric approach which can estimate the productivity and efficiency of a decision-making unit (DMU). SFA was developed on theoretical literature of productive efficiency (Meeusen & van den Broeck, 1977; Aigner, Lovell & Schmidt, 1977), and resulted in developing the production frontier context (Kumbhakar & Lovell, 2000). SFA creates a framework that can analyse firms that do not succeed in optimisation, or are not fully efficient, by comparing firms to 'best practice' (Cummins, Feng & Weiss, 2012). According to Andor & Hesse (2011), the limitation of SFA is that the best it can do is to obtain a 'mean' efficiency over a sample.

Data Envelopment Analysis: DEA, as developed by Charnes, Cooper and Rhodes in 1978, is known as the CCR model, and introduced the efficiency measurement which generalised the single output and single input ratio to multiple inputs and outputs without requiring pre-assigned weights (Charnes & Cooper, 1984). The methodology emerged as an alternative to the traditional regression method analysis. The units that lie in the

'surface' are defined as 'efficient' DMUs (Murillo-Zamorano, 2004). The limitation of DEA is its 'non-stochastic' nature: it does not account for statistical noise (Lovell, 1994). However, this limitation is addressed through employing a bootstrapping method (Efron & Tibshirani, 1998; Simar & Wilson, 2000). For efficiency measurement, this study adopted the DEA: Liu, Lu, Lu and Lin (2013), having surveyed DEA applications, found that DEA was more robust in measuring efficiency than parametric approaches from 1978 to 2000, in which agriculture efficiency analysis was listed within the top five applications in which DEA had been applied. DEA deals with individual DMUs as opposed to the population average, it utilises n optimisation for each DMU, which makes DEA results more reliable (Moffat, 2008).

Agricultural Cooperatives and Profitability Evaluation: Profitability is the primary goal of any business venture (Hofstrand, 2009). It can be measured as the net income over total expenses, or the excess revenue over total expenses, or by return on assets (ROA) which is income before interest and taxes divided by total assets (Moller, Featherstone & Barton, 1996; Marwa & Aziakpono, 2014). Within the theory of firm, optimal prices and quantities are determined by setting the cooperative's marginal cost equal to the marginal revenue and therefore the profit becomes the cooperative performance indicator (Soboh et al., 2009). It is noted that cooperatives behave differently in establishing profitability as they are user-owned, user-benefit, and user-controlled, and they serve the interest of the members (Hardesty & Salgia, 2003, Ortmann & King, 2007b). The economic benefit of members remains the core foundation for income generation and sustainability, and as owners (residual claimants) members are entitled to the net income generated by the firm (Ortmann & King, 2007b; Soboh et al., 2009). Theory indicates that profitability can be measured through either the economic perspective or the accounting perspective (Sexton & Iskow, 1988). The accounting model applying financial ratios to determine the performance of a firm can employ liquidity ratios, asset efficiency, profitability and leveraging for performance measurement. Empirical studies have always employed the traditional financial ratio method to measure the performance and profitability of a cooperative (Marwa & Aziakpono, 2014).

5.3 EMPIRICAL LITERATURE REVIEW

5.3.1 Agricultural cooperatives and efficiency

Studies on whether agricultural cooperatives are efficient have not yielded similar results. Tipi, Yildiz, Nargelecekenler and Cetin (2009) investigated the performance and TE and

the determinants of rice farms in Turkey using an input-oriented DEA model to measure TE scores, and Tobit regression. The regression estimates showed TE was negatively influenced by the number of farmers, age, plot size and off-farm income (Tipi et al., 2009). Soboh et al. (2012) compared dairy cooperatives and investor-owned firms in Europe to measure performance, applying DEA to measure efficiency. They argued that economic literature had limitations in terms of measuring the performance of cooperatives and found that cooperatives' performance was influenced by members' objectives (Soboh et al., 2012). In South Africa, Piesse, Doyer, Thirtle and Vink (2005) investigated the efficiency levels of grain cooperatives in competitive markets using DEA and financial ratios and found that increased competition led to increased efficiency of cooperatives (Piesse et al., 2005).

5.3.2 Agricultural cooperatives and profitability

The accounting method profitability analysis using ROA has been adopted by various studies. Many studies have compared the performance of cooperatives with investor-owned firms, with results signifying that cooperatives were less efficient and profitable than investor-owned firms (Lermann & Parliament, 1991; Hardesty & Salgia, 2003). Hardesty and Salgia used traditional financial ratios to measure performance through testing profitability, liquidity, and leverage and asset efficiency of investor-owned firms against those of cooperatives. They found that, overall, cooperatives demonstrated low rates of asset efficiency, and yet the relative profitability and liquidity was not conclusive (Hardesty & Salgia, 2003). These mixed results are also found in a study by Schrader, where results of Midwestern cooperatives between 1979-1983 showed that cooperatives had various functions and similar rates of return, whilst large diversified investor-owned businesses had high ROA compared to cooperatives (Schrader, 1989).

The above studies demonstrate that measuring financial performance employing traditional ratios such as return on assets (ROA) and return on equity (ROE) has been tested on cooperatives. This study focuses on ROA as a measurement for profitability, rather than ROE: with ROE, cooperatives have limited return on equity capital as the business pays strictly limited dividends on equity capital invested in the organisation (Staatz, 1987). Another limitation is that the value of an enterprise may exceed the value of members' patronage (Schrader, 1989). In the South African context, since agricultural cooperatives are funded by the government, employing ROE will distort the performance results.

5.3.4 Agricultural cooperatives' efficiency and profitability

The debate on whether firm efficiency is directly related to profitability has received varying results. Camanho and Dyson (1999) measured branches of a Portuguese bank and found that branch efficiency has a positive effect on profits, although high profitability is not necessarily directly related to high efficiency. However, in a study of Tanzanian financial cooperatives, the results demonstrated that the majority had low profitability and low efficiency levels (Marwa & Aziakpono, 2014). A study by Keramidou et al. of meat processing companies in Greece interrogated the relationship between efficiency and profitability by applying a decomposition model. The results indicated that there was no strong positive correlation between profitability and efficiency (Keramidou et al., 2013). Hence, there is a need to explore both dimensions in empirical studies. With this study ROA becomes a realistic measure, noting that all the financial statements provided by the agricultural cooperatives have total assets as a variable.

5.4 METHODOLOGY

This study used data from the DAFF's 2015/16 Annual Report on cooperatives. South Africa had a total of 2,682 agricultural cooperatives, of which 571 were in Mpumalanga: however, the number of operational cooperatives was not ratified. The inclusion criteria in the study were the cooperatives that complied with reporting on audited annual financial statements. The study selected the 19 agricultural cooperatives that had complied with Annual Financial Statement (AFS) reporting in 2015/16. The data was available from the Mpumalanga Department of Agriculture, and permission was sought to use the data for preliminary study. To recap on the study on technical efficiency on the preceding chapter (accepted for publication) on efficiency evaluation of agricultural cooperatives, the efficiency scores were measured where technical efficiency was decomposed into pure technical efficiency (PTE) and scale efficiency (SE) using DEA. In this study, a frontier function approach was employed. The frontier methodology technique presents the benchmarking model between DMUs: it measures how a DMU is performing relative to its peers. Frontiers are important for the prediction of technical inefficiencies in the industry (Batesse & Coelli, 1991). It is widely used in agriculture due to its consistency in production, profit and cost functions, with the notion of minimising input or output orientation, or maximising profit (Bravo-Ureta & Pinheiro, 1993).

5.4.1 Measuring Technical Efficiency

Input variables were total assets and total expenses, and output variables were revenue and profit. From the mathematical computation, the formulation of the problem was that cooperatives are treated as firms. In this regard firms seek to minimise inputs and maximise outputs, therefore the function was on cost minimisation and adopted a mathematical model by Coelli et al. (2005).

$$\begin{aligned} &\text{Min } \theta, \\ &\text{subject to } -q_i + Q\lambda \geq 0, \theta x_i - X\lambda \geq 0, \\ &\lambda \geq 0 \end{aligned} \tag{5.1}$$

Where θ is a scalar and λ is a $I \times 1$ vector of constants. The value θ obtained is the efficiency score for the i th firm and satisfies $0 \leq \theta \leq 1$. In this regard, the value 1 indicates a firm lying on the frontier and therefore the firm is technically efficient, according to the definition of Farrell (1957). TE can be decomposed into PTE and SE. DEA was applied to decompose the results. In other words, $TE = PTE * SE$, and in most instances DEAP 2.1 software is able to give only TE and SE, but $PTE = TE/SE$.

5.4.2 Profitability

For profitability analysis the data from 19 agricultural cooperatives were used, with their financial statements for the financial year 2015/16. The data were sourced from the Mpumalanga Department of Agriculture as secondary data. The methodology employed the traditional ratio analysis of ROA. As indicated in the literature review, ROE tends to overcompensate on equity against member patronage. ROA is arguably most popular and user friendly to managers for profitability analysis across firms (Joo, Nixon & Stoeberl, 2011). In essence, ROA gives a measurement on return: how much the return is for every rand invested. This approach is further entrenched by the observation that all the agricultural cooperatives selected had reported on their total assets rather than on equity.

ROA was measured using the following formula:

$$ROA = \frac{\text{net income}}{\text{Total assets}} \tag{5.2}$$

5.4.3 Efficiency/profitability matrix

This study also created an efficiency and profitability matrix, which provides management with an opportunity to review which areas they can improve to achieve higher profitability (Camanho & Dyson, 1999). The efficiency profitability matrix adopted has been employed as a comprehensive measure of performance through various dimensions (Camanho & Dyson, 1999; Keramidou et al., 2013; Marwa & Azikapono, 2014). This model separates the firms' performance levels in four quadrants, where quadrant I represents the sleepers, II represents the stars, III represents the question marks, and IV represents the dogs. Best performers are firms with high efficiency levels and high profitability ratios. The stars are those DMUs that have high efficiency levels and high profitability, which means these firms convert their inputs into outputs efficiently while at the same time recording high profits (Camanho & Dyson, 1999). The sleepers are DMUs with high profitability but low efficiency levels. The dogs are DMUs with high efficiency levels with low profitability, and the question marks are DMUs with low efficiency levels and low profitability ratios (Kumar, 2008). This matrix followed work done by Boussofiane, Dyson and Thanassoulis (1991). The matrix deals with the limitation pointed out in using traditional financial ratios as a measurement, the argument being that it provides a 'snapshot' of the organisation's performance (Altman, 1968; Yeh, 1996). Stata was used to compute the results of the various quadrants, with efficiency plotted against the x axis and profitability against the y axis.

5.5 DESCRIPTIVE RESULTS

Table 5.1 below gives a summary of our results from the 19 agriculture cooperatives using Data Envelopment Analysis Program (DEAP) version 2.1 developed by Coelli (1996).

Table 5.1: Efficiency results

DMU #	Technical Efficiency	Pure Technical Efficiency	Scale Efficiency	Returns to Scale
1	0.501	0.502	0.999	-
2	0.516	0.519	0.994	IRS
3	0.670	1.000	0.670	DRS
4	0.598	0.697	0.858	DRS
5	0.691	1.000	0.691	DRS
6	0.687	1.000	0.687	IRS
7	0.694	0.835	0.831	DRS
8	1.000	1.000	1.000	-
9	0.675	1.000	0.675	DRS

10	1.000	1.000	1.000	-
11	0.945	0.969	0.975	DRS
12	0.192	0.322	0.597	DRS
13	1.000	1.000	1.000	-
14	0.574	0.575	0.999	IRS
15	0.667	0.696	0.959	DRS
16	0.746	0.750	0.995	IRS
17	1.000	1.000	1.000	-
18	0.769	0.952	0.808	DRS
19	0.671	0.865	0.776	DRS
Median	0.68	0.95	0.95	

Source: Author's computation

The results indicate a median score of 68% on technical efficiency, 95% on pure technical efficiency and 95% on scale efficiency. The variance in the efficiency scores implies that the performance of the DMUs varies, as one could be more efficient in terms of TE but less efficient in terms of scale. The explanation is provided below on the observation between TE and SE.

Narrowing it down to TE, From the results, the median score for technical efficiency is 68%, which means that the DMUs' combined technical efficiency rate was at 68%, and there is resource wastage of 32%. It is interesting to note that when the observation is done on individual DMUs, only 21% of the DMUs are 100% technically efficient, operating at constant returns to scale (CRS). From the efficiency analysis, profitability was decomposed using the ROA methodology. Each DMU efficiency was then measured against profitability. Table 5.2 below shows the performance comparison for each DMU on efficiency and profitability. The results are consistent with the previous studies, which demonstrated there was no positive correlation between efficiency levels and profitability (Camhano & Dyson, 1999; Kumar, 2008; Marwa & Aziakpono, 2014).

Table 5.2: Technical Efficiency and profitability comparison

DMU #	DMU	Efficiency	Profit (%)
1	A	0.501	-336
2	B	0.516	0.03
3	C	0.67	8.91
4	D	0.598	-61.15
5	E	0.691	25.5
6	F	0.687	25.00
7	G	0.694	9.71

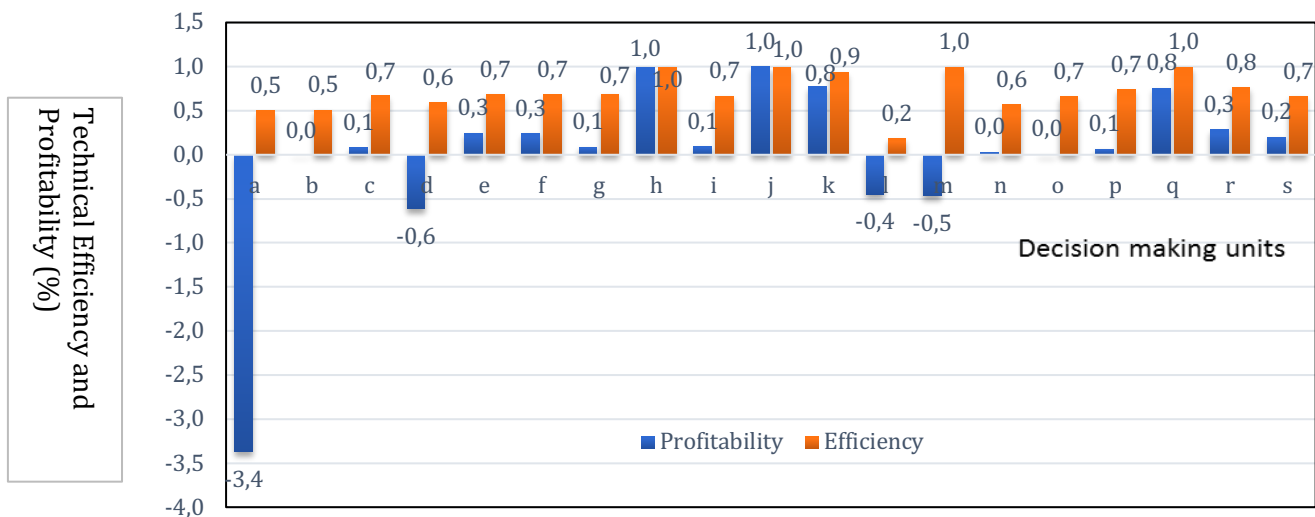
8	H	1	100
9	I	0.675	10.25
10	J	1	100
11	K	0.945	77.73
12	L	0.192	-44.69
13	M	1	-46.68
14	N	0.574	3.47
15	O	0.667	1.38
16	P	0.746	7.59
17	Q	1	76.36
18	R	0.769	29.30
19	S	0.671	20.91
Median		68%	10%

Source: Author's computation

The above table compares each DMU in terms of technical efficiency and profitability. This is informed by testing that efficient cooperatives are also profitable.

It can be seen from the profitability scores in Table 5.2 that the median for profitability is 10%, and 37% of DMUs are above the 10% average. Having decomposed technical efficiency and profitability as shown in Tables 5.1 and 5.2, the technical efficiency and profitability dimension was employed to test if there is a positive correlation between efficiency levels and profitability. Figure 5.1 below provides a descriptive view of the performance, with some DMUs operating at above efficiency levels, and some operating at a loss (less than 0% return rate).

Figure 5.1: Technical Efficiency and profitability scores

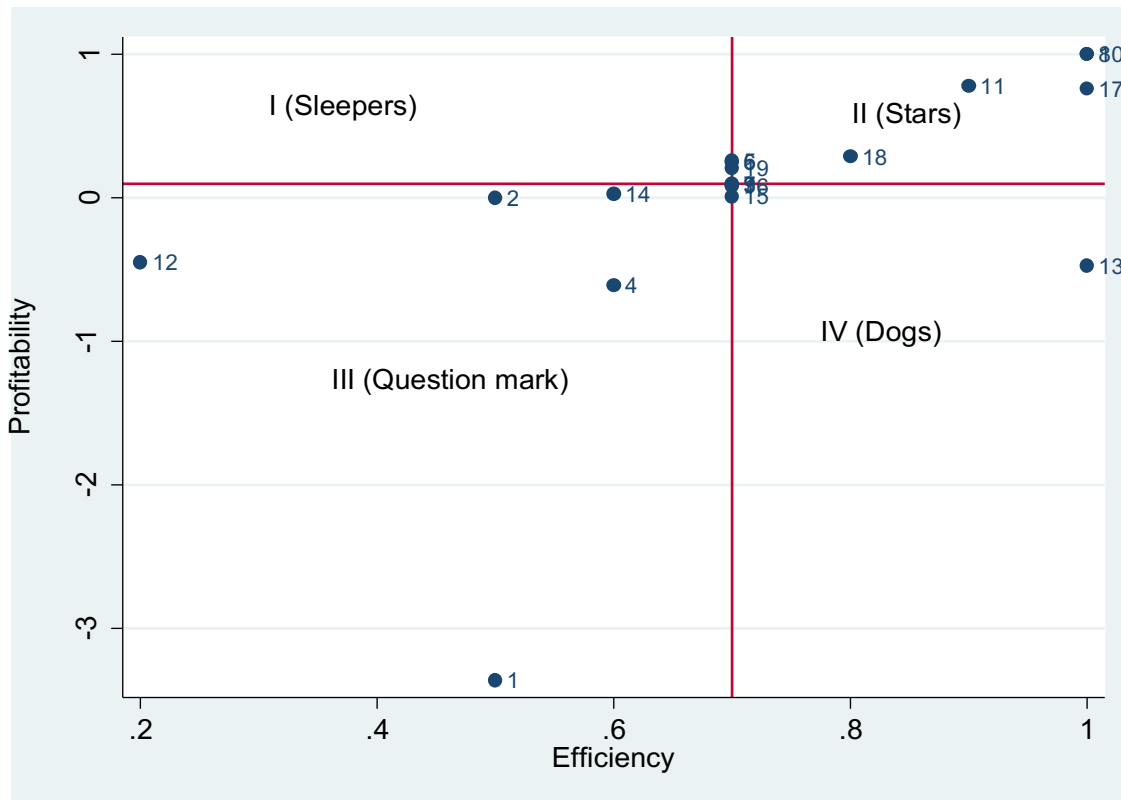


Source: Author's computation

5.4.1 Profitability and efficiency matrix

This study also created an efficiency and profitability matrix, which provides management with an opportunity to review which areas can be improved to achieve higher profitability (Camanho & Dyson, 1999). This matrix follows work done by Boussofiene et al. (1991), and by various studies measuring the relationship between efficiency and profitability for determining best performers (Camanho & Dyson, 1999; Kumar, 2008; Marwa & Aziakpono, 2014). Table 5.3 shows the profitability/ efficiency matrix results, and the quadrants expanding their performance measure, using STATA 14. Quadrant I shows sleepers, quadrant II stars, quadrant III question marks and quadrant IV dogs.

Figure 5.2: Descriptive quadrants for performance of DMUs



Source: Author's computation

The number of DMUs per quadrant is reflected in Table 5.3 below, with the frequency of DMUs in each quadrant.

Table 5.3: Frequency of DMUs in quadrants

Matrix	Frequency	Percent
I (Stars)	5	26.32
II (Sleepers)	5	26.32

III (?)	8	42.11
IV (Dogs)	1	5.26
Total DMU	19	100

Source: Author's computation

5.6 RESULTS AND DISCUSSION

From the above, it can be seen that there is an even distribution between the stars and sleepers in the quadrants, 26% of the firms have high efficiency and high profitability, these firms are best performers and considered as stars. What this means is that 5 out of 19 cooperatives have high efficiency levels with high profitability ratios (stars), and also 5 out of 19 have high profitability and low efficiency levels (sleepers), these DMUs (sleepers) are found in the borders of the quadrants (DMUs 5, 6, 7, 9 and 19). The sleepers will have to improve their resource allocation, which may result in them moving to the stars quadrant. The majority of the DMUs (8 out of 19) are in quadrant 3 (question marks), meaning they have low efficiency levels and low profitability. These firms need to reconsider their operations as there are resource wastages, and the firms should also look at whether their businesses are facing challenging economic conditions such as competition and economic downturn, or if their service is still relevant in the market. Only one DMU was in quadrant 4 (dogs), this firm has a high efficiency level and low profitability level. This firm is utilising resources efficiently and yet operating at a loss.

5.7 CONCLUSION AND RECOMMENDATIONS

The study tested efficiency levels and profitability ratios of agricultural cooperatives, linking efficiency levels with profitability to see if efficient firms are equally profitable. The technical efficiency median was 68%, and the profitability median was 10%. The study further employed the efficiency/profitability matrix, and the results separate the best performers from those firms who are not performing on both efficiency and profitability. There was an even distribution between sleepers and stars, but it is concerning that the majority of the firms were in the question mark quadrant. Only five DMUs (26%) were found to be efficient and profitable, meaning the firms met the means of 68% and 10% profitability respectively. Efficiency does not always translate to profitability, there is a need for managers to continuously measure performance and investigate areas of improvement. Management has a role to play in efficient resource allocation to ensure there are no wastages. The existence of a firm does not mean that it is performing well financially: the weaknesses and

characteristics of an organisation can only be established if there is continuous monitoring, focusing not only on one variable of performance, but employing a multi-dimensional approach to investigate areas of improvement.

Noting that efficiency and profitability are not always positively correlated, managers should understand a cooperative as a business as well as its social role towards economic development. Firms need to continuously follow the market and be in a position to respond to business competition. It is concerning to see that the profitability of agricultural cooperatives is not witnessed across all firms. In this regard, policy makers should appreciate that agricultural cooperatives as firms also have a socio-economic role and members' patronage is inherent as they are user-owned and user-controlled. Future policy decisions should factor in empowering the agricultural cooperatives as firms, for them to be able to manage resources efficiently while at the same time being profitable, resulting in sustainable organisations. It is also important that agricultural cooperatives find the balance between their social role and economic development, such as that of member patronage benefit linked to positive financial benefit. Members of cooperatives also need to review their stance on taking the cooperative as a business, rather than an entity that services users' needs. There is a need for a turnaround strategy to ensure that there is focus on efficient resource allocation and there are measures and systems to stay abreast with the market and competition for their survival.

5.8 REFERENCES

- Aigner, D., Lovell, C.K. & Schmidt, P. (1977). Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics*, 6(1), 21-37.
- Altman, E.I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance*, 23(4), 589-609.
- Andor, M. & Hesse, F. (2011). *A Monte Carlo simulation comparing DEA, SFA and two simple approaches to combine efficiency estimates*. CAWM Discussion paper no. 51. Centre of Applied Economic Research, University of Münster.
- Aoki, M. (1984). *The co-operative game theory of the firm*. Oxford University Press. New York.
- Batesse, G.E. & Coelli, T.J. (1991). Frontier production functions, technical efficiency and panel data: with applications to paddy farmers in India. In Gullledge, T.R. & Knox Lovell, C.A. (Eds.), *International Applications of Productivity and Efficiency Analysis*, pp. 149-165. Netherlands: Springer.
- Boussofiane, A., Dyson, R.G. & Thanassoulis, E. (1991). Applied data envelopment analysis. *European Journal of Operational Research*, 52(1), 1-15.
- Bravo-Ureta, B.E. & Pinheiro, A.E. (1993). Efficiency analysis of developing country agriculture: a review of the frontier function literature. *Agricultural and Resource Economics Review*, 22(1), 88-101.
- Camanho, A.S. & Dyson, R.G. (1999). Efficiency, size, benchmarks and targets for bank branches: an application of data envelopment analysis. *Journal of the Operational Research Society*, 50(9), 903-915.
- Charnes, A. & Cooper, W.W. (1984). Preface to topics in data envelopment analysis. *Annals of Operations Research*, 2(1), 59-94.
- Chaddad, F.R., Cook, M.L., & Heckeley, T. (2005). Testing for the presence of financial constraints in US agricultural cooperatives: an investment behaviour approach. *Journal of Agricultural Economics*, 56(3), 385-397.
- Charnes, A., Cooper, W.W. & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research*, 2(6), 429-444.

- Chibanda, M., Ortmann, G.F. & Lyne, M.C. (2009). Institutional and governance factors influencing the performance of selected smallholder agricultural cooperatives in KwaZulu-Natal. *Agrekon*, 48(3), 293-315.
- Coelli, T. (1996). *A guide to DEAP version 2.1: a data envelopment analysis (computer) program*. Australia: Centre for Efficiency and Productivity Analysis, University of New England.
- Coelli, T.J., Rao, D.S.P., O'Donnell, C.J. & Battese, G.E. (2005). *An introduction to efficiency and productivity analysis*. Springer Science & Business Media. Boston.
- Cummins, J.D., Feng, Z. & Weiss, M.A. (2012). *Reinsurance counterparty relationships and firm performance in the US property-liability insurance industry*. Draft paper submitted to Temple University.
- Debreu, G. (1951). The coefficient of resource utilization. *Econometrica*, 19(3), 273-292.
- Department of Agriculture, Forestry and Fisheries (DAFF). (2015). *The 5th annual report of the status of cooperatives in the sector 2015/16*. Pretoria: Government Printer.
- Department of Trade and Industry (DTI). (2005). *Cooperative Act 14 of 2005*. Pretoria: Government Printer.
- Efron, B. & Tibshirani, R.J. (1998). *An introduction to the bootstrap*. Monograph on statistics and applied probability. Washington DC: Chapman & Hall/CRC.
- Emelianoff, I. (1995). *Economic theory of cooperation: economic structure of cooperative organizations*, 1948, reprinted by the Center for Cooperatives, University of California.
- Farrell, M.J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society. Series A (General)*, 120(3), 253-29.
- Halkos, G.E. & Salamouris, D.S. (2004). Efficiency measurement of the Greek commercial banks with the use of financial ratios: a data envelopment analysis approach. *Management Accounting Research*, 15(2), 201-224.
- Hardesty, S.D. & Salgia, V.D. (2003). *Comparative financial performance of agricultural cooperatives and investor-owned firms*. NCERA-194 Research on Cooperatives, 2004 Annual Meeting, November 2-3.
- Helmberger, P.G. & Hoos, S. (1962). Cooperative enterprise and organization theory. *Journal of Farm Economics*, 44(2), 275-90.
- Hofstrand, D. (2009). Understanding profitability. *Ag Decision Maker*, 2, C3-24.

- Joo, S J., Nixon, D. & Stoeberl, P A. (2011). Benchmarking with data envelopment analysis: a return on asset perspective. *Benchmarking: An International Journal*, 18(4), 529-542.
- Keramidou, I., Mimis, A., Fotinopoulou, A. & Tassis, C.D. (2013). Exploring the relationship between efficiency and profitability. *Benchmarking: An International Journal*, 20(5), 647-660.
- Koopmans, T.C. (1951). Efficient allocation of resources. *Econometrica*, 19(4), 455-465.
- Kumar, S. (2008). An analysis of efficiency–profitability relationship in Indian public sector banks. *Global Business Review*, 9(1), 115-129.
- Kumbhakar, S.C. & Lovell, C.A.K. (2000). *Stochastic frontier analysis*. Cambridge University Press. New York.
- Lerman, Z. & Parliament, C. (1991). Size and industry effects in the performance of agricultural cooperatives. *Agricultural Economics*, 6(1), 15-29.
- Liu, J.S., Lu, L.L.Y., Lu, W.M. & Lin, B.J.Y. (2013). A survey of DEA applications. *International Journal of Management Sciences*, 41(5), 893-902.
- Lovell, C.A.K. (1994). Linear programming approaches to the measurement and analysis of productive efficiency. *Top*, 2(2), 175-248.
- Marwa, N. & Aziakpono, M. (2014). Efficiency and profitability of Tanzanian saving and credit cooperatives: who is a star? *Journal of Economics and Behavioral Studies*, 6(8), 658-669.
- Marwa, N. & Aziakpono, M. (2016). Technical and scale efficiency of Tanzanian saving and credit cooperatives. *Journal of Developing Areas*, 50(1), 29-46.
- Meeusen, W. & van den Broeck, J. (1977). Efficiency estimation from Cobb-Douglas production functions with composed error. *International Economic Review*, 18(2), 435-444.
- Moffat, B.D. (2008). *Efficiency and productivity in Botswana's financial institutions*. PhD thesis submitted to the University of Wollongong.
- Moller, L.G., Featherstone, A.M. & Barton, D.G. (1996). Sources of financial stress in agricultural cooperatives. *Journal of Cooperatives*, 11, 38-50.
- Murillo-Zamorano, L.R. (2004). Economic efficiency and frontier techniques. *Journal of Economic Surveys*, 18(1), 33-77.

- Ortmann, G.F. & King, R.P. (2007a). Agricultural cooperatives I: history, theory and problems. *Agrekon*, 46(1), 18-46.
- Ortmann, G.F. & King, R.P. (2007b). Agricultural cooperatives II: can they facilitate access of small-scale farmers in South Africa to input and product markets? *Agrekon*, 46(2), 219-244.
- Phillips, R. (1953). Economic nature of the cooperative association. *Journal of Farm Economics*, 35(1), 74-87.
- Piesse, J., Doyer, T., Thirtle, C. & Vink, N. (2005). The changing role of grain cooperatives in the transition to competitive markets in South Africa. *Journal of Comparative Economics*, 33(1), 197-218.
- Porter, P.K. & Scully, G.W. (1987). Economic efficiency in cooperatives. *The Journal of Law and Economics*, 30(2), 489-512.
- Schrader, L.F. (1989). Equity capital and restructuring of cooperatives as investor-oriented firms. *Journal of Agricultural Cooperation*, 4, 41-53.
- Schwettmann, J. (1997). *Cooperatives and employment in Africa*. Geneva: ILO.
- Sexton, R.J. & Iskow, J. (1988). *Factors critical to the success or failure of emerging agricultural cooperatives*. Giannini Foundation Information Series No. 88-3. Davis: Division of Agriculture and Natural Resources, University of California.
- Simar, L. & Wilson, P.W. (2000). Statistical inference in nonparametric frontier models: The state of the art. *Journal of Productivity Analysis*, 13(1), 49-78.
- Soboh, R.A.M.E., Oude Lansink, A., Giesen, G. & van Dijk, G. (2009). Performance measurement of the agricultural marketing cooperatives: the gap between theory and practice. *Review of Agricultural Economics*, 31(3), 446-469.
- Soboh, R., Oude Lansink, A., & Van Dijk, G. (2012). Efficiency of cooperatives and investor owned firms revisited. *Journal of Agricultural Economics*, 63(1), 142-157.
- Staatz, J.M. (1987). The structural characteristics of farmer cooperatives and their behavioral consequences. *Cooperative Theory: New Approaches*, 18, 33-60.
- Sykuta, M.E. & Chaddad, F.R. (1999). Putting theories of the firm in their place: A supplemental digest of the new institutional economics. *Journal of Cooperatives*, 14(1), 68-76.

Tipi, T., Yildiz, N., Nargelecekenler, M. & Cetin, B. (2009). Measuring the technical efficiency and determinants of technical efficiency of rice farms in Marmara region, Turkey. *New Zealand Journal of Crop and Horticultural Science*, 37(2), 121-129.

Yeh, Q.J. (1996). The application of data envelopment analysis in conjunction with financial ratios for bank performance evaluation. *Journal of the Operational Research Society*, 47(8), 980-988.

CHAPTER 6

ENABLERS AND INHIBITORS OF PERFORMANCE FOR AGRICULTURAL COOPERATIVES IN MPUMALANGA, SOUTH AFRICA (CASE STUDY)

6.1 INTRODUCTION

The role of agricultural cooperatives in both developed and developing economies has been underpinned by their contribution towards economic development (Stiglitz, 2004). They have significance in improving bargaining and marketing power for members, with the potential to result in profitable businesses (Lerman & Parliament, 1991).

In developed economies, there has been a drive for cooperative formation as means of social enterprises, which has been a reaction of state budget constraints and withdrawal of public entities. The UK has laws promoting cooperatives as social enterprises, whilst in Germany there is an emphasis on the role of the state and economic development with deep focus on social business facilitation (Borzaga & Spear, 2004). In this regard there appears to be a common goal of advancing entrepreneurship through communities, as social enterprises.

Within the African context, cooperatives and agricultural cooperatives in particular have been seen as organisations that have the ability to, amongst others, reduce poverty, enhance livelihood sustainability and create much-needed employment (Wanyama, Delvetere & Pollet, 2008; Ortmann & King, 2007).

In South Africa, post 1994 there has been a drive from government to advance cooperatives, and this created a framework and legislation for agricultural cooperatives to be assisted through financial and non-financial support, with the intention of enabling the cooperatives to operate and contribute towards economic development. In the Co-operatives Act 14 of 2005, the AgriBee Sector Code elevates the role of agriculture and cooperatives in creating meaningful employment and economic growth, through increasing access to economic activities (DTI, 2005).

The enactment of the Co-operatives Act 14 of 2005 saw a surge or increase in the number of cooperatives registered. In the year 1993, pre-democracy, a total of 250 agricultural cooperatives was recorded with the total turnover of R22.5 billion (DAFF, 2012). With the enactment of the Co-operatives Act, there was a high rate of cooperative registrations, the response is seen in the increase in the number of cooperatives that were registered. In

2005 4,000 cooperatives were registered, post the enactment, between 2005 and 2012 more than 50,000 cooperatives had registered in South Africa, indicating a growth of 1,250% in seven years after the enactment of the Co-operatives Act. However, it is concerning that the total 'active' business post registration was less than 50% (Derr, 2013). A study commissioned by the DTI also found post registration, there was a mortality rate of more than 88% (DTI, 2012).

There are several reasons for the high mortality rates: members' commitment was one of them, and it was found that most cooperatives had abandoned their cooperatives as businesses due to members' patronage declining over a period (Chibanda, Ortmann & Lyne, 2009). Other related challenges resulting in poor performance are poor leadership, poor governance, conflict between members and funding constraints (Machete 1990; Chibanda et al., 2009) and inability to access markets which resulted in cooperatives being unable to face challenging market conditions (Piesse, Doyer, Thirtle & Vink, 2005).

This study seeks to further explore the reasons for performance or non-performance through a triangulation method. It follows a study which was done on cooperatives' efficiency and profitability, which demonstrated mixed results, with the majority of cooperatives having low efficiency levels and low profitability levels using an efficiency/profitability matrix (Xaba, Marwa & Mathur-Helm, 2018).

This study uses a triangulation method, where a case study is used to solicit inputs from experts and members: Campbell and Fiske (1959) argued that quantitative and qualitative methods can be used in a complementary way without having to compete for superiority. This study thus extends the traditional performance evaluation literature by making use of the mixed method approach and applies methodological triangulation, using a group of individuals – subject matter specialists or informants – who provide their opinion, whether positive or negative, as described by Kaplowitz and Hoehn (2002).

The case study therefore seeks to address the gap in quantitative analysis by sourcing stakeholder views, which are usually omitted from quantitative results. The findings provide holistic findings on the drivers and inhibitors of performance of agricultural cooperatives. From the 19 agricultural cooperatives that were initially selected, the study narrowed the selection to 10 cooperatives, of which five were best performers and five were performers according to the efficiency and profitability matrix. Opinions were solicited from experts, academics, oversight bodies, government officials and cooperatives management. The results are intended to demonstrate empirically what are the enablers for good performance, and what are the inhibitors resulting in poor performance. The

findings inform how best the future of the cooperatives can be shaped towards sustainable agriculture.

The chapter is structured as follows; Section 6.1.1 explains methodological triangulation, Section 6.2 provides an overview of the literature on enablers and inhibitors, Section 6.3 deals with methodology, Section 6.4 explains the results from the interviews, and Section 6.5 closes with a summary and recommendations.

6.1.1 Methodological triangulation

The method of triangulation is explained as this chapter proceeds from the two previous chapters, which were quantitative, and this chapter employs a qualitative method.

Triangulation as defined by Denzin is a combination of methodologies in the study of the same phenomenon (Denzin, 1978). The scholars of this methodology refer to triangulation as employing more than one approach in the investigation, through multimethod or multitrait analysis, or what they referred to as 'multiple operationism' (Campbell & Fiske, 1959). Campbell and Fiske (1959) acknowledged that no methodology, whether qualitative or quantitative, is superior to another, advocating that both methodologies can be used together without having to compete with each other. Triangulation ensures that the variance reflected is that of a trait and not of a method (Campbell & Fiske, 1959).

Thus multi-method research is usually applied in social and behavioural researches. This methodology provides multiple viewpoints and has the ability to improve accuracy, as the validity of the results is strengthened (Campbell & Fiske 1959; Jick, 1979; Denzin, 2012).

6.2 COOPERATIVES PERFORMANCE ENABLERS AND INHIBITORS – OVERVIEW

Agricultural cooperatives are viewed as firms, with cost minimisation and profit maximisation objectives (Helmlinger & Hoos, 1962). Emalianoff argued that cooperatives should be viewed as aggregate economic units, with a vertical integration model, where each independent enterprise seeks to maximise profits (Emalianoff, 1995). It should, however, be noted that cooperatives also have a social role to play, so over and above profit maximisation, cooperatives need to balance social needs through economic fairness by equal access to markets, which means over and above profitability the interests of the community become paramount (Schwettmann, 1987). It is therefore important that cooperatives perform well and are efficient and profitable to ensure their sustainability.

From an economic perspective, there are various dimensions which result in cooperatives performing well or not performing well. Cooperatives in their form are vertical firms, under a single authority, and vertical integration may be difficult, resulting in market failure leading to inefficiencies (Sexton & Iskow, 1988). Price behaviour, which may lead to price discrimination, noting that members are owners and shareholders and at the same at the end of the value chain (as buyers), also leads to price distortions (Staatz, 1987; Sexton & Iskow, 1988).

Other drivers are related to the size and scale in which the cooperatives are operating. Some authors argue that large cooperatives have higher profitability ratios due to economies of scale (Lerman & Parliament, 1991), while it has been found that smaller cooperatives need to increase their size to increase their competitiveness (Porter & Scully, 1987). Ironically it was argued by Arcas, García and Guzmán that smaller cooperatives perform well as they have less risk of structural complexity, and are able to have cost controls in place, with the danger of increasing membership linked to inability to manage efficiently (Arcas et al., 2011).

There are studies that have further elevated members' role as a driver towards cooperative performance. The appreciation emanates from the narrative that members come from different backgrounds and may not have a common vision. One of the challenges highlighted is that the more heterogeneous the membership, the more difficult it is to achieve goal congruence (Hansmann, 1996). This is extended to agency problems linked with moral hazard, in the case where the agent transacting with a firm poses serious incentive challenges (Hansmann, 1996; Sykuta & Cook, 2001).

Literature on the incentive hazard points out that with an incentive structure there is opportunistic behaviour by members, where member patrons focus on capital acquisition. In this regard 'free rider' problems become evident, where members do not have an interest in investing in the business, but expect monetary benefit in return (Harris, Stefanson & Fulton, 1996).

It has also been noted that members' 'attitude and perception' play a role in ensuring that cooperatives perform, as it relates to trust, and is linked to transactions and revenue generation (Bhuyan, 2007). Members' attributes, which is linked to members' commitment, has been found to be one of the contributors to performance (Österberg & Nilsson, 2009): where member control was found to be weak, cooperatives do not perform efficiently (Hogeland, 2006; Gray & Kraenzle, 1998), and where members were pro-active,

cooperatives were effective and the performance of cooperatives was progressive, resulting in business growth (Cechin, Bijman, Pascucci, Zylbersztajn & Omta, 2013).

Members' commitment also differentiates the cooperatives from investor-owned firms: cooperative members work towards competitive services, and where members cannot differentiate themselves and take advantage of the competitive space, consumers will do business with the cooperative based on loyalty rather than on competitive prices (Fulton, 1999).

There is an interesting empirical literature that found that 'family members' in a cooperative tended to contribute towards cooperative performance. In a study on Western agriculture it was found that family members are difficult to manage, due to the low feasibility of a hierarchical organisation in agricultural production due to supervision and monitoring difficulties (Valentinov, 2007). However, Stattman and Mol found them to be contributing towards better performance and noted that family farmers increased substantially after policy changes in Brazil which gave cooperatives a more prominent role, and this was driven by family members (Stattman & Mol, 2014).

Leadership, governance and management were found to play a critical role: Cook argued that managers have to do with leadership, resource allocation and conflict resolution, and if that leadership fails, where managers are people-oriented in resource allocation and entrench multi stakeholder communication, the probability of the cooperative succeeding is high (Cook, 1994).

The management structure of cooperatives exposes them to proper governance controls, as there seems to be no separation of ownership and control: this exposes the cooperatives to not being managed in a proper governance structure, as noted by Hansmann (1996). Hansmann argued that effective control is better implemented by a manager who is not a patron (Hansmann, 1996). This is further associated with the interest problem, where members have to monitor each other, the cost of this management function does not outweigh the cost of non-monitoring, resulting in weak governance structures (Chaddad & Iliopoulos, 2013).

Chibanda et al. also found that performance of agricultural cooperatives was strongly influenced by institutional and governance problems, where there were low levels of investments by member patrons, but more reliance on government funding. Poor performance was a result of poor governance, worsened by weak control systems, with no secret ballots, low skills levels, and weak marketing arrangements (Chibanda et al., 2009).

Decisions made by cooperative leaders have an influence on whether the cooperatives take a business trajectory or fail, the agency problem however continues to discourage members from employing managers or independent leaders, and this embeds a seed of failure as a result of poor leadership (Fulton & Giannakas, 2007).

The above demonstrates that cooperative performance is dependent on various variables and dimensions, including the size of the cooperative, market prices, and cooperative members. The literature highlights members' commitment, attitudes, and common vision amongst characteristics that can enhance or inhibit cooperative performance. There is also a strong focus on institutional arrangement and management, which can allow the cooperatives to have proper governance controls, discouraging the incentive problem, which is inherent in user-owned, user-controlled firms. Also emerging in this literature review is the role of family cooperatives.

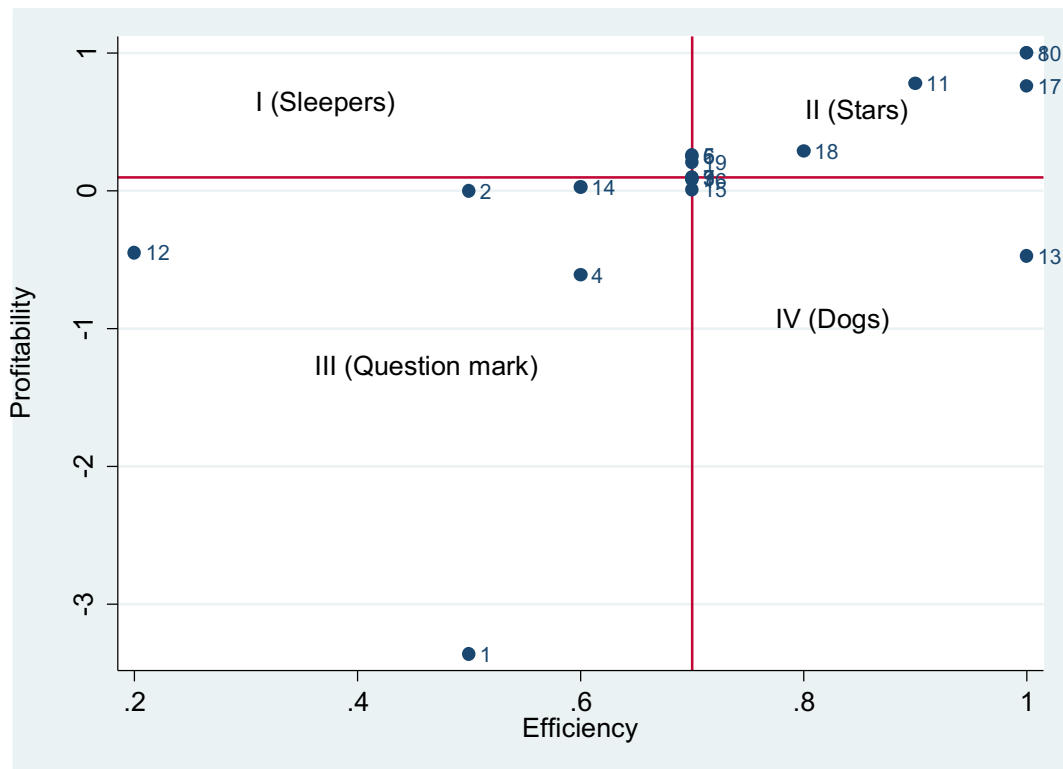
For this study, it is imperative to source stakeholder views on performance enablers and inhibitors for the agricultural cooperatives. Stakeholders will give insight on the case of cooperatives in South Africa, and experts in the industry will give insight and advice in shaping the future of the cooperatives.

The next section deals with the methodology employed to achieve the study objective.

6.3 METHODOLOGY

6.3.1 Selection of cooperatives

The preceding chapter analysed 19 cooperatives for efficiency and profitability, using the efficiency/profitability matrix. From the profitability/efficiency quadrant this study selected the five best performing cooperatives (with high efficiency levels and high profitability rates) which were stars from quadrant II, and five from the eight that were worst performers (with low efficiency levels and low profitability rates) which were found in quadrant III as depicted in Figure 6.1 below.

Figure 6.1: Efficiency/profitability matrix

Source: Xaba et al. (2018)

Quadrant	DMUs
(I) Sleepers	5, 6, 7, 9, 19
(II) Stars	8, 10, 11, 17, 18,
(III) Question mark	1, 2, 3, 4, 12, 14, 15, 16
(IV) Dogs	13

The selection was therefore the first five of best performers (DMUs 8, 10, 11, 17, 18) and the first five worst performers (DMUs 1, 2, 3, 4, 12)

The decision of choosing the extremes is important as it tends to provide a better contrast (Marwa, 2015). In this case, similar to other studies where extreme performers are considered, there seem to be shared characteristics relating to their performance or non-performance (Rose, Petrakis, Callahan, Mambourg, Patel, Hylek & Bokhour, 2012).

Mannion, Davies and Marshall conducted a study of extremes on high and low performers in hospitals, and found that significant patterns were observed within cases grouped by performance (Mannion et al., 2005). And by focusing on either ends of the performance

spectrum, the results provide a sharper contrast in terms of drivers, whether management, governance, or experience, compared to sampling middle performers (Mannion et al., 2005; Marwa & Aziakpono, 2015).

Mpumalanga has four Districts as per Department of Agriculture demarcation: Ehlanzeni South, Ehlanzeni North, Nkangala, and Gert Sibande. The cooperatives are spread across all four districts, however the majority that reported on the financials were from Gert Sibande, followed by Ehlanzeni North. It was then evident that of the selected best five and worst five, nine were in the two districts, Gert Sibande and Ehlanzeni North, with one in Nkangala.

6.3.2 Selection of participants

The study selected individuals who have knowledge and expertise and are key informants in the area of agricultural cooperatives. The selection attempted to solicit balanced views and inputs. The participants selected were: government officials or managers working with agricultural cooperatives, the oversight body office which is the National Department of Agriculture, Forestry and Fisheries (DAFF), Cooperative Support Directorate, the Department of Trade and Industry, the Department of Small Business Development (DSBD)⁶, academia (cooperatives expert) and cooperatives members/management. A summary of participants per category is given in Table 6.1 below.

Table 6.1: Respondent participants per category

Cooperatives' managers	Provincial Department of Agriculture	National Departments (policy makers and regulators)	Academia	Total
9	4	3	2	18

Source: Author's computation

6.3.3 Interview guide checklist

Checklists were drawn up for the interviews, with open-ended questions in order to allow open responses and for respondents to open up on their values, beliefs and motives (Barriball & While, 1994). It was important to elevate the role of the cooperatives and what stakeholders viewed as factors that encourage or inhibit performance. The checklists were a guideline to enable the respondents to respond to similar questions.

⁶ The functions of agricultural cooperatives were transferred from DTI to DSBD in 2014.

There were two separate interview checklists: one for cooperative members and another for government officials/regulators/academia. This was intended to avoid bias for respondents. The majority of the questions related to performance were similar for all the respondents and are detailed below.

Section A had four themes: (i) role of cooperatives and their performance, (ii) performance drivers and inhibitors, (iii) policy support/improvement directive, and (iv) leadership and governance.

(i) Role of cooperatives and their performance

- ✚ *What is the role of agricultural cooperatives in the economy? Why are they existing?*
- ✚ *What is your opinion about the overall performance of agricultural cooperatives? Where do you see their future?*

(ii) Performance drivers and inhibitors

- ✚ *Do you think cooperatives perform at the level at which they are supposed to?*
- ✚ *If they are performing, what do you think are the reasons (at least 3 reasons – and elaborate?)*
- ✚ *If they are not performing, what do you think are the reasons (at least 3 reasons – and elaborate?)*
- ✚ *List three things which you are proud of about cooperatives and three which you are not proud of?*

(iii) Policy support/improvement directive (questions were asked differently to respondents)

- ✚ *What would you suggest – what needs to be done by government to ensure that cooperatives are functional? (this question was structured for cooperative members)*
- ✚ *What needs to be done by cooperatives (members) – to ensure that cooperatives are functional and operate as sustainable businesses? (question was posed to government officials)*

(iv) Leadership and governance (this section was responded to by government officials and regulator)

- ✚ *Is the type of leadership/management style important with regard to performance and improvement?*
- ✚ *And suggest how can leadership/management shape the performance of agricultural cooperatives.*

Section B focused on cross-cutting issues, which are global issues. This section covered:

- ✚ *Membership dynamics*
- ✚ *Political interference*
- ✚ *Governance, transparency and accountability*
- ✚ *Business objectives (mechanisms to realise growth)*

- ✚ *Succession planning and skills transfer*
- ✚ *Corruption, embezzlement and mismanagement.*

6.3.4 Results analysis: Thematic method

The study employed a thematic analysis (TA) method to follow the emerging behaviours. Braun and Clarke (2006) argued that qualitative methods can be complex to analyse: in searching for themes and patterns, thematic analysis offers a theoretically flexible approach to analysing qualitative data (Braun & Clarke, 2006). TA is “a method of systematically identifying, organising and offering insights into patterns of meaning across data set” (Braun & Clarke, 2012:57). Aronson (1995) simplifies the methodology with an explanation of the process: (i) respondents are interviewed to understand their experiences; (ii) the entire interview is transcribed; (iii) patterns of experience are listed (Aronson, 1995). In this regard thematic analysis focuses on identifiable themes and patterns, and this process can be done through listing experiences that sometimes come from respondent’s direct quotes (Aronson, 1995).

TA is further explained by approaches: the inductive approach and the deductive approach. The inductive approach is a bottom up approach, informed by what is in the data, and coding closely matches the content of the data. The deductive approach is theory-driven, the researcher reduces the data to a series of concepts, and responses will be derived from these themes and concepts (Braun & Clarke, 2012).

The TA approach taken in the data analysis of this study is a combination of both inductive and deductive approaches: scholars have affirmed that in reality coding uses a combination of both, as it cannot be purely inductive because researchers always bring a theme s for the respondents to discuss (Braun & Clarke, 2012; Braun, Clarke, Hayfield & Terry, 2019).

In analysing the data from stakeholder perception, the respondents responded through recorded interviews and after the interviews the researcher highlighted the themes for the day. It was important to note varying responses, but also to capture ‘common or similar’ responses, grouping issues emerging across respondents and those that were unexpected. What came across all interviews was then summarised, with the topic being captured as a ‘focus area’, and responses separated and grouped as ‘emerging pointers’ and ‘unexpected’.

6.4 RESULTS AND DISCUSSIONS

From the focus area, the summary of key pointers and unexpected responses was captured. It was interesting to note that when some questions were asked, their responses overlapped with a question that was still to be asked. For example, when asked about the reasons for non-performance, some respondents delved into governance and members' conflict. In this regard, the narrative results capture what strongly came out, although in some instances there is an overlap.

Table 6.2: Emerging issues/highlights and the unexpected

Focus area	Emerging pointers	Unexpected
Role of cooperatives and their performance	<ul style="list-style-type: none"> ✚ Formed on a principle of having to work together ✚ To create much-needed employment ✚ To have the aggregate output bargaining power ✚ Majority of them do not perform well 	<ul style="list-style-type: none"> ✚ Formed cooperative to access government grant funding ✚ Family-owned cooperatives are more sustainable than non-family owned
Performance drivers and inhibitors	<p>Drivers</p> <ul style="list-style-type: none"> ✚ Members' commitment ✚ Access to markets ✚ Governance and leadership <p>Inhibitors</p> <ul style="list-style-type: none"> ✚ Inability to raise capital ✚ Members' conflict ✚ Corruption ✚ Lack of capacity and skills 	<ul style="list-style-type: none"> ✚ 'Culture' of cooperative members inhibits performance
Policy support/improvement directive	<ul style="list-style-type: none"> ✚ Government to address the 'culture' of cooperative members – the entitlement syndrome ✚ No one size fits all – members should be screened – common vision important, to be congruent with 	<ul style="list-style-type: none"> ✚ Provinces at times do not implement the programme as per the policy defined resulting in 'policy and reality gap' ✚ Government officials not equally equipped

	business objectives	
Leadership and governance	<ul style="list-style-type: none"> ✚ Is the core/foundation for the centre to hold ✚ High performers had proper governance systems in place 	<ul style="list-style-type: none"> ✚ Skills set – where a nurse or teacher was leading a cooperative as opposed to someone qualified in farming/agriculture

SECTION A: PRIMARY QUESTIONS

6.4.1 Role of cooperatives, why they exist, and their performance?

Cooperatives are governed by equal voting power, follow a principle of equal treatment of members, and have mainly unallocated funds (Nilsson, Svendsen & Svendsen, 2012). The purpose of forming cooperatives becomes multi-faceted, and this depends on the understanding between government and cooperative members themselves. Cooperatives were formed to create jobs and contribute towards the economy, and equally to address social ill issues (Schwettmann, 1997). In addition, from government, cooperatives were formed to have a 'common market' or 'buying power'. Cooperatives are seen to play the role of aggregation, in this regard, to pull resources together so there are some aggregate outputs, leading to a single or multiple markets for income generation in line with the studies that advance economies of scale (Lerman & Parliament, 1991).

There is also a dimension that sees cooperatives as vehicles that have the ability to stimulate the economy through 'multiplier' effects, in cases where there is value addition, for example through agro-processing, there are spin-offs from job creation. This is seen as important for government officials, as cooperatives are seen to be addressing the high unemployment rate in South Africa, agreeing with the studies by Schwettmann (1997) and Ortmann and King (2007).

Cooperative members also form a cooperative so they can work together applying the principle of 'cooperating' with each other (Wanyama et al., 2008). There is however an incentive in forming cooperatives, because once members form cooperatives, they will be able to access government grant funding. With this objective the monetary incentive is elevated, which at times is argued to be inherent in cooperatives (Borgen, 2004). It is concerning that once the grant funding is exhausted, the membership patronage declines or the businesses are abandoned, as seen in a study by Sykuta and Cook (2001).

One cooperative manager from a high performing cooperative responded:

We started the cooperative more than 10 years ago, and when we started there were 47 members, we received government grant, and at some stage we started to have challenges, later on we were 27 members, to day after 10 years we are left with only 6 members (where one member died).

What has sustained their business was the commitment of the members who remained when others left the business, as they refocused and approached government for further funding, and they feel that because of the size of the group and the culture, accompanied by members' commitments, they are able to run the cooperative as a business.

Another cooperative member respondent from a low performing cooperative emphasised that it was a known factor that most of the time, the cooperative members do not have a common vision, and they join the cooperative for the government grant incentive.

What also came out as an unexpected pointer was that cooperatives which are formed by family members have the ability to stand the test of time, as opposed to cooperatives formed by community members (Stattman & Mol, 2014).

On the respondents' opinion about overall performance, and where they see the future of cooperatives, it was noted that performance was driven by either good practices or bad practices. The cooperative members were somehow not able to confidently demonstrate this, more than the fact that the community recognises that they work in a cooperative. What was encouraging from one of the cooperatives is that they now comply with the South African Good Agricultural Practice Standard (they were SAGAP⁷ compliant), which gave them a competitive advantage on market readiness.

From a government perspective, there was consensus that some cooperatives perform well, but they are a drop in the ocean as the majority of the cooperatives were not performing well. It should be noted that, because they are formed by government, the cooperative members do not have the mindset of running a business, but the majority of them demonstrate a sense of entitlement, where government has to continuously provide them with financial support: this is in line with findings by Ortmann and King (2007).

What are three things that they are proud of about agricultural cooperatives?

There was a general response, regardless of whether high performing or low performing and government, and common responses are that:

⁷ SAGAP compliance is linked to agricultural businesses being audited and meeting food safety and quality standards.

- a) There are pockets of success despite the limited resources that cooperatives have.
- b) From these pockets of success, the majority of them have access to local markets, with retailers such as Pick n Pay and Spar, although ideally they would want to see their products reaching an export destination.
- c) They have greater outreach, in terms of having a social impact in communities from which they operate, there was a sense of being 'employed' and also the business is 'owned' by members of the community to which they belong.

What are three things that they are not proud of about agricultural cooperatives?

The most highlighted concerns/areas which cooperatives and government officials saw as detrimental to cooperatives were:

- a) Conflict amongst members, deeply entrenched in group dynamics, where members come from different backgrounds and do not have a common goal.
- b) Reliance on government funding, cooperatives cannot on their own leverage funding outside government. There is a strong reliance on grants.
- c) The skills set is not up to the level of running a business, cooperative members are not business orientated, but more opportunistic.

6.4.2 Performance drivers/inhibitors

This question was partly responded to under the overall performance of agricultural cooperatives. The response was consistent in the sense that some cooperatives perform well, although not at the level in which they are supposed to, due to limited resources (financial, infrastructure and access to markets). The majority of the cooperatives do not perform at the level which they are supposed to. This is in line with the fact that even those that are 'high performers' are not at optimum level (for example, high profitability with low efficiency levels), and some even though they were found to be technically efficient, had low profitability levels, signalling room for improvement.

For those that are performing, the following were their attributes or characteristics:

- a) The cooperatives work as a team, there is collective ownership and responsibility.
- b) With the above comes transparency, members knew what needed to be done, and at what cost. This was accompanied by regular meetings.

- c) Resources (finance and infrastructure) were seen to be the main catalyst, the argument is that a group can have a common vision, but if there are no resources, the cooperative will fail.

Interestingly, the reasons for failure are the somehow exact opposite of the reasons for success, in particular the first two:

- a) Group dynamics, where only one member is the focal point of the business and other members do not have a say.
- b) There are no control systems in place, which leads to maladministration and mismanagement risk.
- c) Skills were also highlighted as important. Where there is no capacity building, no mentorship and no skills plan, the cooperative will fail as a business.

6.4.3 Policy support/improvement directive

What should be done by government to ensure that cooperatives are functional? (this question was structured for cooperative members)

There is a strong belief that at times government organises community members to form cooperatives for the electorate and at times the support is not targeted in a sense that it achieves its intended goal or has full leverage. Government needs to work on the 'culture' of the cooperatives: it tends to benchmark South Africa and cooperative functions with other developing economies, ignoring the fact that South Africa is a unique case, the successes and policy directives from other developing economies are imposed in South Africa. What remains at the core, and is the differential from other developing economies, is that South Africa has a strong reliance on government funding, and it also has the 'culture' of entitlement informed by the post-1994 policy narrative of redressing the injustices of the past. In this regard there should be an appreciation that South Africa leans within the policy rhetoric–reality gap, which seeks to distinguish that there is always a gap between policy intention and policy implementation (Sutton & Levinson, 2001; Pak Tee, 2008).

Interestingly, as much as this question was posed to cooperative members, government officials made reference to it highlighting political interference (what should or should not be done) in this regard.

Formation of cooperatives is sometimes used as an instrument to win the electorate. In certain instances, politicians will make promises to the cooperatives

which are left with government officials to fulfil. This creates a disjuncture in terms of what support can be provided, and which support is driven by a political head. (This response links to the question of political interference).

With regard to what needs to be done by cooperatives (members) to ensure that cooperatives are functional, the advice is that cooperatives need to be capacitated and trained. This was noted and highlighted in the sense that there is a feeling that cooperative members are a group who in most instances do not have agricultural experience, and use inexperienced members to run agriculture as a business.

The selection of cooperative members needs to be aligned with members' interest in the agricultural field, as opposed to grouping people on the principle of being unemployed. This is evident as noted that at registration, cooperatives will have a high number of members, and over time when there is no income or grant funding, members exit the group. This was evident in low performing cooperatives (DTi, 2012)

It was also highlighted that there is sometimes a disjuncture between the policy itself and what is being implemented on the ground, due to the regulator not being on the ground but relying on the provinces to implement, and at times the programme was implemented to satisfy the masses. This poses a gap between policy and reality, in this case it was found that there was a gap between espoused policy and implementation, which has fundamental differences in policy rhetoric, the implementation process and examining reality, resulting in what is termed as 'reality gap'. The argument posits that policy is more symbolic than actionable when dealing with communities (Pak Tee, 2008).

6.4.4 Leadership and governance

On leadership it was stated as extremely important, as observed with successful cooperatives, that leadership or management were dynamic and engaged with cooperative members, running the business as on a 'collective ownership' principle, agreeing with findings of Chibanda et al. (2009) and Chaddad and Iliopoulos (2013). In contrast, in two of the worst performing cooperatives, leadership is stagnant and what also stood out was that one cooperative chairperson has held that seat for more than ten years, even in cases where other executive members rotated, this one particular member has never been rotated. There was a sense that when there is no collective decision making, the functions and the direction in which the cooperative takes is dependent on an individual. Needless to

say, this challenge was found in one of the low performing cooperatives (Chaddad & Iliopoulos, 2013).

Is the type of leadership/ management style important with regard to performance and improvement? This question was posed to government officials.

There was consensus across government officials that management style is important, with a demonstration that where there were regular meetings, and accountability with regard to finances, and also giving members a fair chance of participation when there are government workshops, such project had a glue that was holding them together, which resulted in a group effort to succeed (Cook, 1994). In this regard, when good management is in place (given all the resources), performance is highly likely to improve (Hansmann, 1996).

SECTION B: FOLLOW-UP QUESTIONS

Section B had follow-up questions that are regarded as global issues, or cross-cutting. These are questions which at times cooperative members or officials avoid confronting.

6.4.5. Membership dynamics

Members' synergies and conflicts are what either make or break the project. What was significant from the five high performers was that members kept the principle of working together, and from low performers there was a common pattern of members' conflicts, in line with Fulton (1999). It was raised as a concern by one cooperative that some members have a strong personality and come across as controlling, which results in other members fearing them or being afraid to question certain issues with them. In that regard cooperative members will not take the initiative to do certain work to the advancement of the cooperative as there is only 'one voice' in the business (Hogeland, 2006).

6.4.6 Political interference

There was general agreement that cooperatives can be used for political gains, in line with Ortmann and King (2007). In instances where cooperatives are successful, new members can be imposed at a later date, without proper consultation with the members. What came out strongly is that the imposition is always tied in with the election period, and accompanied with promises for the masses.

6.4.7 Corruption, embezzlement and mismanagement

Corruption has been found to be the one factor that destroys cooperatives. It also links to group dynamics, and leadership (management and governance). There was a positive correlation where there was no proper governance, one member who runs the cooperative, and the cooperative finances are unaccounted for, and this leads to business failure, as noted by Cook (1994) and Gray and Kraenzle (1998).

Mismanagement goes beyond finances, it was also touching on infrastructure and assets that had been provided by government. There was a sense that at times it gets to be used outside the benefit of the cooperative (for example, a tractor). One respondent highlighted:

We received a tractor from government, and from time to time it will provide work outside our own project, but we will never see the income from that service. As it stands the tractor no longer has wheels, it's standing still, we wait for government to fix it so we can continue using it on our farm.

Finances was another concerning factor:

We were told government gave us a grant, we see stuff is being procured, production inputs etc., but do not know from where they were procured, and at what cost. Five years being a cooperative member, to date we have never seen a bank statement.

These were interesting responses coming from cooperative 'managers' themselves, either they were excluding themselves from the process or it was a matter of one individual 'owning' the cooperative.

This being the global question, it was the most sensitive, and in that regard cooperative members did not want the researcher to mention if it was coming from low or high performers but to be more general. Needless to say, government officials acknowledged that over and above challenges faced by cooperatives, corruption was the major contributor for business failures (Mude, 2006).

6.5 CONCLUSION AND RECOMMENDATIONS

Agricultural cooperatives globally, within the African context and within South Africa, play a role in advancing the economy through the formation of social enterprises. This study captured stakeholder views through the quantitative analysis of the performance of agricultural cooperatives in Mpumalanga province, where efficiency and profitability were measured.

The study selected ten agricultural cooperatives, where five were best performers and five were worst performers. The stakeholder views were segmented between cooperative managers, government officials, policy makers, regulator and academia.

What came out as emerging issues were that cooperatives do not perform at the level at which they are intended to as there was no common vision, and to put it bluntly, some were formed to access government grants as they are more incentive driven, as found by Sykuta and Cook (2001). Those that are performing are only a drop in the ocean, and it was found that even with those that were performing there was room for improvement, in the sense that even those that were efficient were not profitable. These findings are in line with Lerman and Parliament (1991) and Chibanda et al. (2009).

Despite the performance challenges, those recorded as pockets of success had managed to sustain their businesses with limited resources. And members' commitment came out to be a strong factor on their survival, as it was also found to be a common characteristic among high performing cooperatives, in line with the findings of Fulton (1999) and Österberg and Nilsson (2009).

Leadership and governance were at the core of the failure of many cooperatives, coupled with mismanagement and embezzlement, as found in studies by Cook (1994) and Chibanda et al. (2009). Other issues that emerged were training and skills for cooperative members, which tended to result in poor performance, and this extended to government officials who could not provide the appropriate support to cooperatives as they were not skilled themselves. Political interference played a role in destabilising some progress as imposition of members can increase the number of members but not the size of the cooperative (Arcas et al., 2011).

In closing there was an indication of rhetoric policy and reality gap, where the implementation of the programme is not in line with the policy itself, further agreeing with studies on policy rhetoric and reality gap by Sutton and Levinson (2001) and Pak Tee (2008) which highlighted the gap between the 'ideal' and implementation reality.

The implications are therefore as follows:

For cooperatives, there needs to be a game plan on how the cooperatives function: the commitment of members cannot be measured up front, however cooperative members need to recruit each other based on a 'common vision'. Cooperative members also need to be educated/skilled and to implement proper governance controls.

There is a need for cooperative members to learn from the high performing cooperatives. In light of the fact that all of them start from similar economic backgrounds, with limited resources, all is needed is to change their strategy and adopt good practices from high performers.

Government support should not be mass driven, but an analysis needs to be done on which cooperatives should be supported, it is also important not to have 'number of cooperatives' as a target, but government should narrow down the focus on those that are willing to be in the agricultural space. In providing financial support, government should adopt a policy of risk sharing, where cooperatives put in equity and have 'skin in the game': it is expected that their performance will safeguard their investments if they have something to lose. There should be a consideration of listing non-performers who received grant funding from the credit bureau: harsh as this may appear, it can offset the risk of government grants being wasted with no consequences.

Noting that there was a policy gap, government and policy makers need to appreciate this gap, and to work on it, maybe to have a bottom-up approach and thorough consultative sessions with the provinces and cooperative members when designing policies. Programmes should not be fully benchmarked with other developing economies but be mindful of the fact that South Africa is a unique case.

6.6 REFERENCES

- Arcas, N., García, D. & Guzmán, I. (2011). Effect of size on performance of Spanish agricultural cooperatives. *Outlook on AGRICULTURE*, 40(3), 201-206.
- Aronson, J. (1995). A pragmatic view of thematic analysis. *The Qualitative Report*, 2(1), 1-3.
- Barriball, K.L. & While, A. (1994). Collecting data using a semi-structured interview: a discussion paper. *Journal of Advanced Nursing*, 19(2), 328-335.
- Bhuyan, S. (2007). The “people” factor in cooperatives: an analysis of members’ attitudes and behavior. *Canadian Journal of Agricultural Economics/Revue canadienne d’agroeconomie*, 55(3), 275-298.
- Borgen, S.O. (2004). Rethinking incentive problems in cooperative organizations. *The Journal of Socio-Economics*, 33(4), 383-393.
- Borzaga, C. & Spear, R. (Eds.). (2004). *Trends and challenges for co-operatives and social enterprises in developed and transition countries*. Trento: Edizioni 31.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper, P.M. Camic, D.L. Long, A.T. Panter, D. Rindskopf, & K.J. Sher (Eds.), *APA handbook of research methods in psychology (Vol. 2): Research designs: Quantitative, qualitative, neuropsychological, and biological* (pp. 57-71). Washington, DC, US: American Psychological Association.
- Braun, V., Clarke, V., Hayfield, N., & Terry, G. (2019). Thematic analysis. *Handbook of Research Methods in Health Social Sciences*, 843-860.
- Campbell, D.T. & Fiske, D.W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, 56(2), 81-105.
- Cechin, A., Bijman, J., Pascucci, S., Zylbersztajn, D. & Omta, O. (2013). Drivers of pro-active member participation in agricultural cooperatives: evidence from Brazil. *Annals of Public and Cooperative Economics*, 84(4), 443-468.
- Chaddad, F. & Iliopoulos, C. (2013). Control rights, governance, and the costs of ownership in agricultural cooperatives. *Agribusiness*, 29(1), 3-22.

- Chibanda, M., Ortmann, G.F. & Lyne, M.C. (2009). Institutional and governance factors influencing the performance of selected smallholder agricultural cooperatives in KwaZulu-Natal. *Agrekon*, 48(3), 293-306.
- Cook, M.L. (1994). The role of management behavior in agricultural cooperatives. *Journal of Agricultural Cooperatives*, 9, 42-58.
- Denzin, N.K. (1978). *The research act: A theoretical introduction to sociological methods*. New York: McGraw-Hill.
- Denzin, N.K. (2012). Triangulation 2.0. *Journal of Mixed Methods Research*, 6(2), 80-88.
- Department of Agriculture, Forestry and Fisheries (DAFF). (2012). *A report on the Agricultural Cooperatives Indaba*. Pretoria: Government Printer.
- Department of Trade and Industry. (2005). *Co-operatives Act 14 of 2005*. Pretoria: Government Printer.
- Department of Trade and Industry. (2012). *Integrated strategy on the development and promotion of cooperatives: promoting an integrated cooperative sector in South Africa*. Pretoria: Government Printer.
- Derr, J.B. (2013). The co-operative movement of Brazil and South Africa. *Sustainable Development*, 1(2013), 1-14.
- Emelianoff, I. (1995). *Economic theory of cooperation: economic structure of cooperative organizations* (1948), reprinted by the Center for Cooperatives, University of California.
- Fulton, M. (1999). Cooperatives and member commitment. *LTA*, 4(99), 418-437.
- Fulton, M. & Giannakas, K. (2007). Agency and leadership in cooperatives. In K. Karantininis & J. Nilsson (Eds.), *Vertical markets and cooperative hierarchies*, pp. 93-113. Dordrecht: Springer.
- Gray, T.W. & Kraenzle, C.A. (1998). *Member participation in agricultural cooperatives: A regression and scale analysis*. RBS Research Report 165. US Department of Agriculture.
- Hansmann, H. (1996). *The ownership of enterprise*. Cambridge: Harvard University Press.
- Harris, A., Stefanson, B. & Fulton, M.E. (1996). New generation cooperatives and cooperative theory. *Journal of Cooperatives*, 11, 15-28.
- Helmberger, P. & Hoos, S. (1962). Cooperative enterprise and organization theory. *Journal of Farm Economics*, 44(2), 275-290.

- Hogeland, J.A. (2006). The economic culture of US agricultural cooperatives. *Culture & Agriculture*, 28(2), 67-79.
- Jick, T.D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly*, 24(4), 602-611.
- Kaplowitz, M.D. & Hoehn, J.P. (2002). Do focus groups and individual interviews reveal the same information for natural resource valuation? *Ecological Economics*, 36, 237-247.
- Lerman, Z. & Parliament, C. (1991). Size and industry effects in the performance of agricultural cooperatives. *Agricultural Economics*, 6(1), 15-29.
- Machete, C.L. (1990). Factors contributing to poor performance of agricultural cooperatives in less developed areas. *Agrekon*, 29(4), 305-309.
- Mannion, R., Davies, H.T. & Marshall, M.N. (2005). Cultural characteristics of “high” and “low” performing hospitals. *Journal of Health Organization and Management*, 19(6), 431-439.
- Marwa, N.W. (2015). *Efficiency and sustainability of Tanzanian saving and credit cooperatives*. Unpublished PhD Thesis. University of Stellenbosch, Cape Town
- Marwa, N., & Aziakpono, M. (2015). Financial sustainability of Tanzanian saving and credit cooperatives. *International Journal of Social Economics*, 42(10), 870-887.
- Mude, A. (2006). *Weakness in institutional organisation: explaining the dismal performance of Kenya's coffee cooperatives*. Contribution paper presented at the International Association Agricultural Economist Conference, Australia (August 12-18, 2006).
- Nilsson, J., Svendsen, G.L. & Svendsen, G.T. (2012). Are large and complex agricultural cooperatives losing their social capital? *Agribusiness*, 28(2), 187-204.
- Ortmann, G.F. & King, R.P. (2007). Agricultural cooperatives II: Can they facilitate access of small-scale farmers in South Africa to input and product markets? *Agrekon*, 46(2), 219-244.
- Österberg, P. & Nilsson, J. (2009). Members' perception of their participation in the governance of cooperatives: the key to trust and commitment in agricultural cooperatives. *Agribusiness: An International Journal*, 25(2), 181-197.
- Pak Tee, N. (2008). Education policy rhetoric and reality gap: A reflection. *International Journal of Educational Management*, 22(6), 595-602.

- Piesse, J., Doyer, T., Thirtle, C. & Vink, N. (2005). The changing role of grain cooperatives in the transition to competitive markets in South Africa. *Journal of Comparative Economics*, 33(1), 197-218.
- Porter, P.K., & Scully, G.W. (1987). Economic efficiency in cooperatives. *The Journal of law and economics*, 30(2), 489-512.
- Rose, A.J., Petrakis, B.A., Callahan, P., Mambourg, S., Patel, D., Hylek, E.M. & Bokhour, B.G. (2012). Organizational characteristics of high-and low-performing anticoagulation clinics in the Veterans Health Administration. *Health Services Research*, 47(4), 1541-1560.
- Schwettmann, J. (1997). *Cooperatives and employment in Africa*. Geneva: ILO.
- Sexton, R.J. & Iskow, J. (1988). *Factors critical to the success or failure of emerging agricultural cooperatives*. Giannini Foundation Information Series No. 88-3. Davis, CA: Division of Agriculture and Natural Resources, University of California.
- Staatz, J.M. (1987). The structural characteristics of farmer cooperatives and their behavioral consequences. *Cooperative Theory: New Approaches*, 18, 33-60.
- Stattman, S.L. & Mol, A.P. (2014). Social sustainability of Brazilian biodiesel: The role of agricultural cooperatives. *Geoforum*, 54, 282-294.
- Stiglitz, J.E. (2004). *The role of cooperatives in globalization*. Working paper No. 9/24 presented at the International Conference of the Culture of Development, Globalisation and Cooperative Enterprise, Genoa, Italy, 2–3 July 2004.
- Sutton, M. & Levinson, B.A. (Eds.). (2001). *Policy as practice: Toward a comparative sociocultural analysis of educational policy* (Vol. 1). Wesport, Connecticut: Ablex Publishing.
- Sykuta, M.E. & Cook, M.L. (2001). A new institutional economics approach to contracts and cooperatives. *American Journal of Agricultural Economics*, 83(5), 1273-1279.
- Valentinov, V. (2007). Why are cooperatives important in agriculture? An organizational economics perspective. *Journal of Institutional Economics*, 3(1), 55-6.
- Wanyama, F.O., Develtere, P. & Pollet, I. (2008). *Encountering the evidence: Cooperatives and poverty reduction in Africa*. Working Papers on Social and Co-operative Entrepreneurship WP-SCE 08-02. Available at SSRN: <https://ssrn.com/abstract=1330387> or <http://dx.doi.org/10.2139/ssrn.1330387>.

Xaba, T., Marwa, N. & Mathur-Helm, B. (2018). Efficiency and profitability analysis of agricultural cooperatives in Mpumalanga, South Africa. *Journal of Economics and Behavioral Studies*, 10(6), 1-10.

CHAPTER 7

SUMMARY, CONCLUSION AND RECOMMENDATIONS ON THE STUDY

7.1 INTRODUCTION

The first chapter of the study gave the background and context of cooperatives, and agricultural cooperatives in particular, from a global position, Africa and South Africa. The research focused on performance evaluation of agricultural cooperatives in Mpumalanga, South Africa. The study unpacks the role agricultural cooperatives play in the economy, with that it then provides motivation as to why performance evaluation is important. The chapter provided the objective of the study, most importantly the study contribution. The study used secondary data from annual financial statements for the financial year 2014/15. The evaluation was premised on three proxies: efficiency, profitability and sustainability. The three measurement proxies were in chapters, which have been presented in publishable papers.

The second chapter gave a historical context and evolution of cooperatives within South Africa, and emphasis was on legislative development pre and post 1994, and assessment of whether the transformation policy also resulted in development of cooperatives.

Chapter 3 provided context on literature review to provide scope on performance measurement. These three chapters served as background to the empirical papers in Chapters 4 to 6.

Chapter 4 investigated the efficiency of agricultural cooperatives, applying the technical efficiency dimension. Chapter 5 measured profitability ratios and an efficiency measurement was included, resulting in an efficiency/profitability matrix. Chapter 6 presented case study evidence on performance of agricultural cooperatives, this extended the quantitative method to a qualitative method, resulting in a methodological triangulation, where stakeholder reviews provided insight on the performance of agricultural cooperatives, and again informing the sustainability drivers.

7.2 SUMMARY OF KEY FINDINGS

7.2.1 Landscape and legislation development of cooperatives in South Africa

Although Chapter 2 provided the landscape and historical context, there is recognition that pre 1994 the segregation further entrenched the marginalisation in the economy, and post

1994 the South African government came up with reform policies and legislation, the latest piece of legislation governing the cooperatives being the Cooperative Act (14 of 2005). What came out in the chapter was that the enactment of the Act provided structure as cooperatives could be registered as legal entities, thereby strengthening governance. The transfer of cooperatives from Department of Agriculture to Department of Trade and Industry provided the cooperative landscape with ambitions of creating sustainable enterprises.

7.2.2 Theoretical literature and empirical literature review

The literature presented various schools of thought: classical theory, neo-classical theory, new institutional economics and coalition theory. Prominent was the classical theory of a firm, where cooperatives are viewed as firms with input minimisation and profit maximisation objectives. Empirical literature narrated various forms of performance measurement, the accounting method and economic method. With the economic method two methodologies were found to be widely used: the parametric (SFA) and non-parametric approach (DEA). The study adopted DEA due to it being unit invariant, and motivation was that it has been widely used to measure performance in the agricultural sector.

7.2.3 Efficiency evaluation of agricultural cooperatives

The findings demonstrated that average technical efficiency was at 72%, which implied 28% resource wastages. Only five of the 19 cooperatives were 100% technically efficient, and the same cooperatives that were 100% technically efficient were also operating at constant returns to scale. These findings signalled that the size of the cooperative has a direct correlation with its performance.

7.2.4 Profitability analysis (efficiency/profitability matrix)

The matrix used the efficiency scores and profitability ratios to test if efficient cooperatives were profitable. The matrix indicated that 26% (5 out of 19) of the cooperatives had high efficiency levels with high profitability (stars), and 42% (8 out of 19) were in quadrant 3, categorised as 'question mark', indicating that they had low efficiency rates and low profitability ratios. Only one out of the 19 cooperatives had a high efficiency level and low profitability score. The findings serve as a concern, noting that a majority of the cooperatives were found in quadrant 3, with low efficiency scores and low profitability

ratios. The results also demonstrated that efficiency does not always translate to profitability.

7.2.5 Enablers and inhibitors for agricultural performance: case study

The study selected the five best performers in the star quadrant and the five worst performers in the question mark quadrant for the case study. What came out from stakeholders reviews as enablers for performance were access to finance, access to markets and good governance, relating to leadership and proper management systems. On the inhibitors, what resulted in the cooperatives not performing were lack of access to finance, membership dynamics and conflict, incentive problems, no common vision and mismanagement.

7.3 OVERALL IMPLICATIONS AND RECOMMENDATIONS

The study demonstrated in sequence that the agricultural cooperatives are not performing at the level at which they are supposed to. With that, there are policy implications. Their performance (improvement) will require that the three stakeholders – cooperatives themselves, government and policy makers – create an environment that will realise the ambitions of cooperatives being integrated into the mainstream economy.

7.3.1 Cooperatives actions

Cooperatives need to review the size of the businesses, or scale in which they are operating. The continuing operations do not imply that the business is efficient in resource allocation. There is a need for smaller cooperatives (primary cooperatives) to consider joining resources, to form secondary cooperatives and to increase economies of scale, which will have a positive impact on their efficiency levels. With regard to profitability, cooperative members need to strengthen their entrepreneurial skills, and run cooperatives as businesses. There has to be cognisance that efficiency does not translate to profitability, and therefore whilst management is attending to efficient resource allocation, the profitability objective should not be lost to ensure business sustainability. Cooperative managers and members need to continuously investigate measures to stay abreast and remain relevant in the market to avoid business failure. For stakeholder views, member commitment and recruitment on common vision should be fundamental. Cooperative managers need to adhere to proper governance controls and systems, and have a framework of oversight and consequences in the event that members are found to have brought cooperatives into disrepute.

7.3.2 Government actions

In recognition that the size of the cooperative has implications on the performance and efficiency levels, government should package cooperative support in line with their scale of operations as opposed to providing them all with similar support. Over and above financial support, skills development for cooperatives should be prioritised. Cooperative members must be empowered to run cooperatives as businesses and, noting the concern raised on mismanagement and poor governance controls, funding must have stringent selection criteria. One of the eligibility considerations to be probed is that of cooperatives having proper governance controls. Government should also review having 'number of cooperatives formed' as an annual target, as this drives the numbers registered, with no proper business development support.

7.3.3 Policy makers actions

Policy makers should be mindful of the policy rhetoric and reality gap between policy and implementation. There should be a bottom-up approach when designing policy, to better capture what is practically implementable. There is a tendency to align South African support with other developing economies, and yet there are differences in the sense that South Africa has a young democracy, and therefore should be treated a unique case.

Working with government, policy makers should come up policies on a risk-sharing mechanism. This will ensure that cooperatives have 'skin in the game', and protect government investment, and encourage the cooperatives to deliver on the objectives which they were created for: job creation and economic development.

7.4 LIMITATIONS OF THE RESEARCH

The study focused on Mpumalanga Province, although the findings can be found in other provinces, there is a limitation in that the results were not tested in other provinces, and may provide different results. The research had data limitations due to high non-compliance from cooperatives not having audited financial statements, even so signalling that they were operating at a level or within the premise of a 'business'. The qualitative study was invaluable, however from the cooperative managers, there could have been information bias from the respondents.

7.5 FUTURE RESEARCH

As this study identified certain limitations, extending the study to other provinces can provide a better analysis on the performance of cooperatives. From a policy area, there is also an opportunity to investigate the 'policy-gap' and come up with alternative policies based on empirical studies. With the functions of the cooperatives being transferred from DAFF to DSBD, this research can be used to provide context on future studies to be employed on cooperatives informing future policy development.

APPENDIX A: Interview checklist

PERFORMANCE EVALUATION OF AGRICULTURAL COOPERATIVES IN MPUMALANGA: DRIVERS AND INHIBITORS OF PERFORMANCE (CASE STUDY)

PLEASE NOTE:

Completion of this interview is on a voluntary basis, a key informant has the right to withdraw from the interview. The researcher will complete the questionnaire

All information will be treated as **STRICTLY CONFIDENTIAL** and will only be used for academic purposes.

This interview should last between 45-60 minutes.

Instructions for completion:

1. Please answer the questions as objectively and honestly as possible.
2. Where asked for comments or to express your own opinion, keep answers short and to the point.
3. Please answer all the questions, as this will provide more information to the researcher so that an accurate analysis and recommendations can be properly captured

SECTION A

Question 1: Role of cooperatives and their performance

1.1 What is the role of agricultural cooperatives in the economy? Why are they existing?

According to your opinion are they serving the purpose which they were formed for? If not why?

1.2 What is your opinion about the overall performance of agricultural cooperatives?
Where do you see their future?

1.3 What are three things you are proud of about agricultural cooperatives?

1.4 What are top three things you are not proud of about agricultural cooperatives?

Question 2: performance drivers/inhibitors

2.1 Do you think cooperatives perform at the level at which they are supposed to?

2.2 If they are performing, what do you think are the reasons (at least 3 reasons) and elaborate?

2.3 If they are not performing, what do you think are the reasons (at least mention 3 reasons, and elaborate)?

Question 3: Policy support/Performance improvement directive

3.1 What would you suggest: what needs to be done by government to ensure that cooperatives are functional?

3.2 What needs to be done by cooperatives (members) to ensure that cooperatives are functional and operate as sustainable businesses?

Question 4: Leadership and governance

4.1 Is the type of leadership/ management style important with regard to performance and improvement?

4.2 And suggest how can leadership/management shape the performance of agricultural cooperatives?

Are there any other issues that you would like to add/which we haven't covered during our discussion?

SECTION B:

5. Follow up questions

Please provide your opinion on the following pertaining to agricultural cooperatives:

5 (a) membership dynamics

5 (b) Political interference

5 (c) Governance, transparency and accountability

5 (d) Business objectives (growth and mechanisms to realise growth)

5 (e) Succession planning and skills transfer

5 (f) Corruption, embezzlement and mismanagement

Thank you for participating in this interview

Would you like to have an executive summary of the findings?

 Yes No

Contact details:
