SASAE

South African Society for Agricultural Extention
Suid Afrikaanse Vereeniging vir Landbou Voorligting

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SYNERGISING AGRICULTURAL EXTENSION SERVICES TOWARDS THE COMMERCIALISATION OF SMALLHOLDER PRODUCERS.

PROCEEDINGS OF THE 52ND CONFERENCE OF THE SOUTH AFRICAN SOCIETY FOR AGRICULTURAL EXTENSION

4 JUNE – 7 JUNE, 2018
PREMIER HOTEL EAST LONDON ICC,
EAST LONDON, EASTERN CAPE PROVINCE.

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FOREWORD

It has become customary to have the conference proceedings available on CD-Rom. From this year due to the cost involved to produce and post the CD's, the proceedings will only be available on the SASAE website. We also experienced problems with the post of the CD's, where many were returned, undelivered.

We are grateful to all the speakers for their contributions and for submitting their papers in time. Because of time constraints, the papers included in these proceedings have only been edited, where necessary, for print and appearance conformity, but have not been peer reviewed and are thus the sole responsibility of the authors.

SASAE Editorial Committee

TABLE OF CONTENTS

SASAE AWARDS: 2018.

Awards Committee.

Every year the Awards Committee of the SASAE Board sends out letters to Members to solicit nominations for Awards of the Board. During 2018 the Awards Committee proposed the following Awards to Members, which the Board approved:

1. AWARD CEREMONY 7 JUNE 2018

During the Gala Dinner of the Annual Conference we had an Award Ceremony where Members were awarded according to the criteria in the SASAE Awards Bylaws.

1.1 SASAE Floating Trophy for a Young Professional

A young Extension Officer (with ten years or less service) who has demonstrated a combination of service, leadership and participation in conferences relating to Agricultural Extension will qualify for this award. This year the Award was won by **Mr. L Mokoena, of the Eastern Cape Branch.**

1.2 TIM BEMBRIDGE EXTENSION MANAGEMENT AWARD (BRONZE)

The recipient of this award has made substantial management contributions to extension on a continuous basis. This year **Mr. N Ndzimande of the Eastern Cape Branch** won the Award.

1.5 Loubie Loubser Floating Trophy

This Award is for the most active Branch of the Society. This year the **Central Branch** won this Award.

2. POPULAR PAPER, SCIENTIFIC PAPER & BEST POSTER AT CONFERENCE.

During the conference, the participants were asked to evaluate all the papers that were presented at the Conference according to certain criteria and to nominate the **"Most Popular Paper".**

The winner was **S. B. Maseko (with co-authors N. T. Ntombela, T. L. Ngubane & P. P. K. Hlatshwayo) from the KwaZulu-Natal Branch.** The title of his paper was: ***"Commercialisation of smallholder goat producers' extension partnership interventions in Msinga".***

During the Conference the Editorial Committee evaluated all the papers presented at the Conference according to a set of criteria to determine the **"Most Scientific Paper"**.

This year the winner was **T. O. Olorunfemi (with co-authors A. O. Adekunle & O. D. Olorunfemi) of the Central Branch,** for the paper: ***"Assessment of the attitude and challenges to expected performance of extension agents: Evidence from Ondu State, Nigeria".***

During the Conference we had a Poster Session where a number of posters were displayed. There was a panel who adjudicated the posters to determine the **"Best Poster"**.

The winner was **T. G. Ngotho, S. Ngcamphalala & Y Pakela-Jezile from the Central Branch.** The title of their Poster was: ***"Partnerships strengthening for ICT in Agricultural Extension: Towards smallholder farmer development".***

Back to Table of Contents

OPENING SESSION.
SCRIPTURES AND PRAYER.

Reverent L Mantini.

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Back to Table of Contents

WELCOME ADDRESS.

Moodley, Kuben L.[1]

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Back to Table of Contents

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OFFICIAL WELCOME & OPENING OF THE 52ND CONFERENCE OF SASAE.

Bese, D. F.[2]

This PDF File will be separate on the "Proceedings of Conference 2018" webpage. We could not have it in the Proceedings document.

Back to Table of Contents

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KEYNOTE SPEAKER:

VAN DEN BERG, J. B.[3]

This PDF File will be separate on the "Proceedings of Conference 2018" webpage. We could not have it in the Proceedings document.

Back to Table of Contents

[3] Berg Foods Africa.

FIRST SESSION:
DEVELOPMENT AND TRANSFORMATION IN AGRICULTURE THROUGH PARTNERSHIPS: HOW DOES THE NWGA COMMERCIALISE COMMUNAL WOOL GROWERS?

De Beer, L.[4]

1. INTRODUCTION:

Development is a basic responsibility of Government, especially when it comes to the "poorest of the poor". This is guided by legislation and policies for which the RDP provided a framework.

Development in practice however necessitates a multi-stakeholder involvement to uplift communities to levels where they could eventually take responsibility for their own development and improvement of their livelihoods. Government alone will have very limited success in development if this is not done in partnership with private sector.

Operation Phakisa for example developed plans and frameworks for development that are essentially based on partnerships with commodity groups and private sector, generally referred to as PPP (Public Private Partnerships).

If farmers are not around the table, they are most probably on the menu! (Dr Theo de Jager, President of the World Farmers' Organisation).

2. PRINCIPLES OF SUCCESSFUL PARTNERSHIPS

1. Shared vision between partners (although individual interests may differ).
2. Partnerships should bring scale, effectiveness and innovation to development efforts.
3. Development partnerships should complement the role, capabilities and resources of partners and stakeholders involved.
4. Partnerships require commitment and shared responsibility from all parties involved – also the beneficiaries!
5. Sound communication and scheduled meetings of prescribed and representative structures of all stakeholders involved to resolve challenges, disputes and conflict are essential.
6. PPP is a well-known acronym in development today and an important requirement for successful development.
7. Organised Agriculture should be considered as an important partner in rural development and should not simply be labelled as just another NGO. Commodity groups for example are organised structures of producers and therefore partnerships with commodity organisations should be seen as partnerships with producers (and subsequently the intended beneficiaries) – especially where development of agriculture and producers is the objective.

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8. Organised Agricultural structures will remain in place and in support of producers after formal partnerships in development have been concluded – other NGO's generally withdraw after a partnership agreement expires.
9. Organised Agriculture and Commodity Organisations have first-hand knowledge, experience and information on the real needs and challenges of producers.
10. Organised Agriculture has the knowledge, skills and expertise to support enterprise development in development partnerships.
11. From experience, organised communities/producers at grassroots level seem to participate more constructively and responsibly in development initiatives, resulting in more successful development outcomes.
12. Development is long term and certainly does not happen overnight, therefore development partnerships should also be long term.
13. Development should be based on sound scientific- and physical evidence and principles i.e. genetic improvement, availability of infrastructure, economic viability, etc. Agricultural production cycles also necessitate timeous support and interventions i.e. breeding/lambing seasons, planting dates.
14. Funding through development agents could be more costly, especially where these agents do development on the back of commodity organisations.
15. Non-Profit Organisations should have preference when tax payer's money is used for development, but also considering its capabilities. For-profit Organisations should generally enter the program as a result of the success of development!
16. Development partnerships should be sensitive in the utilisation of public funds (tax payers' money) to develop enterprises that will compete and be detrimental to similar enterprises that contributed to Government funds through payment of taxes and providing employment on its own initiative and from own resources.
17. Development partnerships should only support initiatives that have a reasonable chance for success.
18. Development partnerships should be based on mutual trust and should learn from its mistakes.
19. Successful partnerships are guided by sound agreements and achievable, realistic outcomes.
20. Successful development partnerships should result in beneficiaries that are empowered to help themselves to sustain their livelihoods and manage their own destination without relying on ongoing government- and outside support and intervention.

3. CHALLENGES OF DEVELOPMENT PARTNERSHIPS

1. Funding support and selection of development partners should be aimed at achieving desired impacts at optimum cost, especially where tax payers' money is involved.
2. Corruption at all levels is one of the biggest stumbling blocks in development and partnerships, also negatively impacting on partnerships that managed projects with unqualified audits and a successful track record.
3. Communication and partnerships with Government are extremely challenging due to:
   3.1 Senior positions filled by acting officials who has limited authority and decision making (due to suspensions, vacancies, etc.).

3.2 The high incidence of personnel turnover in senior decision making positions has a huge negative impact on continuity, trust and relationships built over time.

3.3 Meetings in Government keep government officials so occupied that they have very limited time to meet with their clients (whom supposedly should be their main responsibility). These are the clients of Government that are essentially the main reason and purpose why Government is in place! Various high level postponement of engagement with industry could be cited.

3.4 Little or no feedback from Government – simply no reply on correspondence, e-mail, or e-mail messages replying that the recipient's in-box is full!

3.5 Decision making procedures by Government seems very complicated and extremely time consuming. Agricultural production cycles need timeous responses and feedback. Malpractices and corruption are to be blamed for many of this, which seriously impacts on service delivery by providers' whose services are rendered responsibly.

3.6 Involvement of stakeholders in various initiatives by government to develop strategies simply seems to end up in barely any implementation of those strategies. Operation Phakisa took place during October 2016, almost 21 months ago….!

3.7 Long term development partnerships with Government are essential, but lack thereof is nowadays blamed on the principle that one administration cannot commit a next administration (decided by elections every five years) through a contract. This seriously contradicts a basic principle of development partnerships over long term to be successful.

3.8 Lack of agricultural experience and -knowledge of some Government employees in senior positions is a serious threat and challenge to rural development.

3.9 Lack of Trust!

4. NWGA TRAINING & DEVELOPMENT PROGRAM

The NWGA has identified various challenges in cooperation with communal wool sheep producers and initiated a focused Wool Sheep Training and Development Program in 1997 to address these challenges. This program is funded by the Wool Trust and is implemented by the NWGA on contract with Cape Wools SA (CWSA), the executive arm of the Wool Trust. Partnerships with national-, provincial- and local government, as well as commercial producers, international donors, commercial banks, input suppliers, tertiary institutions and private sector complement this very successful initiative.

This program involves the following focus areas:

- Organising wool sheep producers into Wool Growers' Associations (WGA) to collectively harvest, class and pack their wool to enable them to access the formal wool market;
- Training and mentorship;
- Market readiness and access;
- Genetic Improvement of communal flocks; and
- Infrastructure development.

Wool sheep farming in the communal areas of the Eastern Cape, KZN and Eastern Free State has already been in existence for centuries. It is therefore an existing enterprise and an asset that communal producers own and where production practices could be improved drastically through appropriate and constructive interventions.

An independent study conducted by the University of Pretoria in 2012 indicated that individual producers own on average 70-113 sheep (De Beer & Terblanché, p109; Tapson p13). Wool is marketed and traded on the formal auction in bales weighing between 100kg and 200kg. These relatively small numbers of sheep consequently yield too little volumes of wool annually to allow for an individual producer to access the formal wool market. Wool is furthermore required to be classed into specified quality lines based on length, strength, fibre diameter and clean yield, which creates a further challenge for small scale producers to have sufficient volumes to access the formal market. ***These producers are therefore forced to sell their wool to hawkers in the informal market at prices that are far less than prices realized on the formal market.***

There are an estimated 4 million wool sheep in communal ownership producing an estimated 8 million kg of wool per annum. More than 90% of wool produced in SA (including wool from communal producers) are exported to mainly China, Czech Republic, Italy, Germany, Bulgaria, India and others, earning foreign currency for these communities in the most rural and extensive farming areas in South Africa.

The first step in the development initiative is to organize wool sheep producers into WGA's so that they can collectively harvest their wool clip, as well as class and pack wool as required by the formal market. Members of these associations are then trained and mentored by qualified and experienced NWGA Production Advisors, empowering these producers to participate in the export market and drastically increase their household income from wool and improving their livelihoods. There are generally between 30 to 40 individual members in an association, supporting at least 240 dependents.

The involvement of private companies (input suppliers in animal health and feed), tertiary institutions (University of Pretoria, Rhodes University, Nelson Mandela University, University of Fort Hare, Elsenburg Agricultural College and Grootfontein Agricultural Development Institute) in partnership with NWGA is fundamental to this important capacity building effort.

Proper infrastructure is however needed to harvest the wool (shear the sheep), handle the sheep, class and pack the wool in bales (using a wool press to ensure bales are at optimum weight to save on transport and marketing costs), as well as treat their sheep against external parasites through dipping them in a proper dipping facility after shearing (included in the infrastructure). Shearing infrastructure is generally constructed in partnership with Government.

The NWGA T&D program is furthermore supported through a comprehensive genetic improvement program (in partnership with Government: Department of Rural Development and Land Reform) and marketing support (in partnership with commercial wool brokers i.e. BKB and OVK/CMW) to ensure full participation in the export market.

Wool is auctioned on a weekly basis in Port Elizabeth after a sample is tested for its qualities (to determine the price) at the Wool Testing Bureau.

The Wool Industry has record of more than 1400 organized wool producing communities (Wool Growers' Associations) in the Eastern Cape and KZN, producing wool from approximately 2000 sheep/community.

The impact of this very successful program is reflected in the following table (CWSA).

Table 1: The impact of wool marketed through the commercial Market.

Impact: Wool marketed through the commercial market (auction) and income of communal wool producers (CWSA)

Season	Kilogram	Value (R)	Nat. Price (c/kg)	Comm. Price (c/kg)
97/98	222 610	1 502 908	1 225	675
99/00	336 700	1 965 557	1 102	584
01/02	535 911	6 927 640	2 277	1 293
03/04	2 029 556	17 768 955	2 109	876
08/09	2 666 933	43 149 706	2 548	1 618
09/10	2 807 161	64 676 989	3 222	2 304
12/13	3 461 937	131 842 578	5 537	3 803
13/14	3 806 993	137 919 368	6 016	3 623
14/15	3 582 123	130 849 388	6 863	3 652
15/16	4 462 089	233 618 025	7 668	5 235
16/17	5 812 641	299 882 008	8 156	5 159

Cape Wools SA is a non-profit company that is mandated to keep independent records and statistics according to a statutory measure overseen by the National Agricultural Marketing Council (NAMC) under the Agricultural Marketing Act (Act No. 47 of 1996).
From the table it is clear that the T&D program already had a drastic impact on the income generated from wool over twenty years. The potential income could still be doubled should, amongst others, proper infrastructure be put in place to empower these producers to improve the harvesting practices and classing of their clip. The result of proper infrastructure utilised optimally will significantly increase the average price of communal producers, which is currently about 60% of the national average price (see table above). This, combined with more wool marketed through the formal export market (versus the informal wool market) will all contribute to the improvement in wool income, an asset that is already in existence and ready to be explored through this comprehensive intervention!

5. SOCIAL INDICATORS

Since 2004 Dr Dave Tapson (University of Rhodes) conducted an independent survey of the social influence this program has in the communal areas. The latest survey report was published during July 2015.

The social impacts of the wool development program in the rural areas of the Eastern Cape were surveyed in 2004, 2006, 2009 and 2015 (Tapson, p15). Some of the significant results are:

- The number of households with children going to bed hungry has declined from 41% in 2004 to 24% in 2015 and appears set to continue downwards;
- The number of households with savings accounts has increased from 49% in 2004 to 84% in 2015 and seems set to continue upwards; and
- The number of households having to borrow money for school fees has decreased from 77% in 2005 to 48% in 2015.

Tapson (p.16) made the following comments in his July 2015 report**: *"The strongest indicator of the value of the NWGA programme is that it has persisted now over a long period and has expanded rapidly, while not losing focus and impact. This is probably the most important indirect finding of the survey".***
The success of this development initiative is well documented and recognised widely for its consistent performance over two decades already. The NWGA also has a proven track record of successful partnerships with various departments (i.e. Agriculture, Forestry and Fisheries; Rural Development and Land Reform; Provincial- and Local Government; International Funding Agencies and Private Sector companies).

6. EXAMPLES OF IMPACTS ON WOOL PRODUCING COMMUNITIES THROUGH THE NWGA T&D PROGRAM:

The improvement in the wool income of four shearing sheds in the Eastern Cape due to the T&D program is presented in Figure 1.

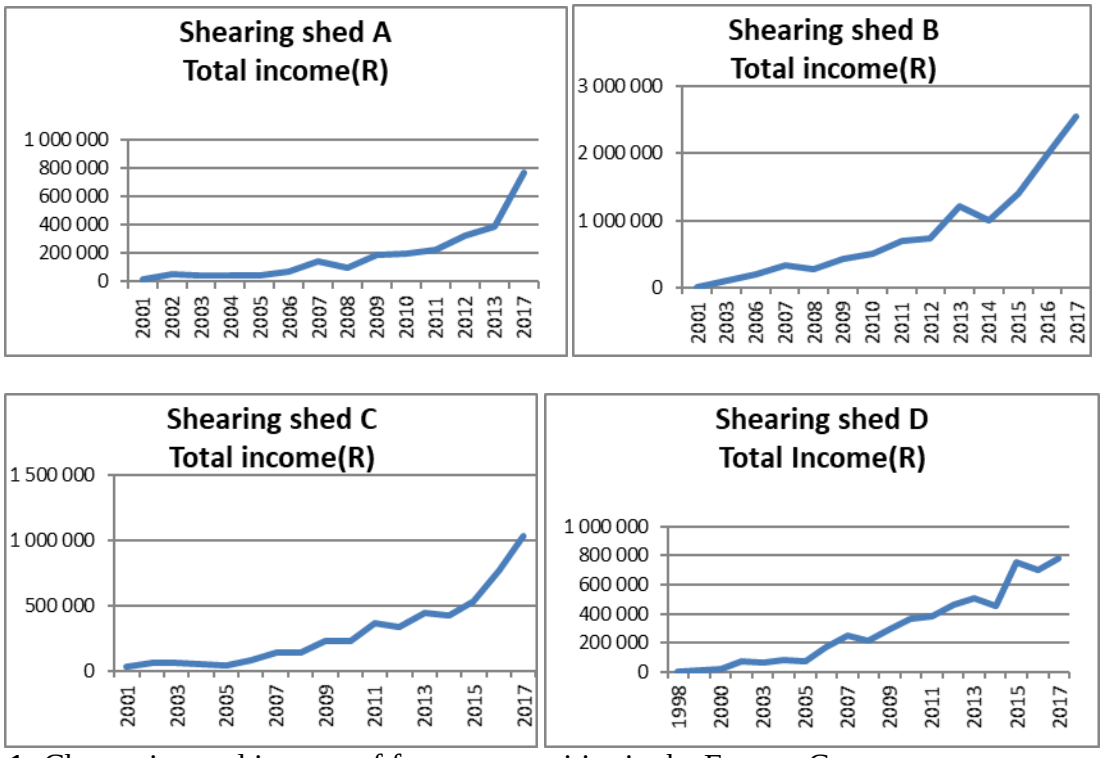

Figure 1: Change in wool income of four communities in the Eastern Cape participating in the NWGA T&D program (Account sales reports).

- The income of Shearing shed A increased from R17 000 per annum in 2001 to R390 000 in 2013 (**2 194%**); R764 000 in 2017 (4 394%);
- Shearing shed B from R17 000 (2001) to R1,2million (2013) (**6 985%**); R2,5million (**14 900%**);
- Shearing shed C from R32 500 (1995) to R445 000 (2013) (**1 269%**); R1.03million (**3 069%**); and
- Shearing shed D from R7 000 (1998) to R510 000 (2013) (**7 185%**); R778 000 (**11 014%**).

7. CONCLUSION

- Agree on a shared set of values from the start;
- Determine the commitment (time and money) from each partner;
- Set down rules and responsibilities for each partner;
- Establish who will lead, who will be acknowledged and how; and
- Include these in an agreement of all parties involved.

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Back to Table of Contents

COMMERCIALISATION OF SMALLHOLDER FARMERS: A REALITY OR MYTH?

Monde, N.[5]

THIS PRESENTATION WAS NOT AVAILABLE AT THE TIME THE PROCEEDINGS WAS PRODUCED.

Back to Table of Contents

[5] University of Fort Hare. Email address:

THE ROLE OF EXTENSION IN FARMING ENTERPRISE AND ACTIVITIES CONTRIBUTING TO SUSTAINABLE FOOD SECURITY.

Mahlathi, V.[6]

THIS PRESENTATION WAS NOT AVAILABLE AT THE TIME THE PROCEEDINGS WAS PRODUCED.

Back to Table of Contents

6

SECOND SESSION:
UNDERSTANDING SMALL HOLDER FARMERS ATTITUDE TOWARDS COMMERCIALIZATION OF INDIGENOUS GOATS IN UMVOTI AREA, KWAZULU-NATAL.

Qulu, S. S.,[7] Mnguni, T.[1] & Hlatshwayo, P. P. K.[1]

Corresponding author: S. S. Qulu.

ABSTRACT

Umvoti Municipality, KwaZulu-Natal Province reveals that indigenous goats are the most common livestock of the communal farmers and yet they do not make significant contribution to the economy. Indigenous goats are mainly sold informally. Goat meat is not found in any butcheries or shelves of the super markets. Many produce indigenous goats for human consumption, gifts and traditional ceremonies. Commercialization of indigenous goats would enhance food security and improve household incomes. The purpose of this study was to understand the attitude of smallholder farmers towards commercialisation of indigenous goats in Umvoti area of Kwazulu-Natal into a viable system of producing, processing and marketing indigenous goats and their by-products through formal markets.

A structured questionnaire was used to collect data from 65 of 100 indigenous goat farmers belonging to a local farmers association. Samples of 65 farmers were sampled utilizing a stratified random sampling technique. Data was collected using personal interviews with an aid of a structured questionnaire. The study established that 60% of goat farmers' does rear / select indigenous goats with good commercial characteristics for sale. It was also found that these farmers used various weighing methods to determine price for the goats. 72% of the indigenous goat's farmers indicated that they were trained in rearing goats but not all are using those skills. All sampled farmers indicated willingness to participate in formal marketing (auction) should it be available. 75% of farmers indicated that they will participate in goat slaughtering as a cooperative to sell goat meat. 61% of smallholder farmers were male with women making up 38%. 36% of farmers are above the age of 60, 75% married and with most farmers having a secondary level education with 46% in total. Farmers' attitude towards commercialization of indigenous goats was found to be very positive despite lack of infrastructure in the area. More focused extension program should be developed to support these farmers towards commercialization.

Keywords: Indigenous goats, Small-holder farmers, Commercialization

1. INTRODUCTION
1.1 Background

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According to NAMC (2005) indigenous goats is the collective term utilized for all varieties of S. A goat breeds. Special breed names are often given according to geographical location in which goats occur. The indigenous goats of S.A differ in horn, coat type, gar length, colour and overall size. They are mostly medium size; environmental extremes are commonly responsible for variation in size between goat types depending on their adaptability. Indigenous goats selection criteria is survival in nature, they never receive special care and management practices being milked (by some culture) and kraaled at night. They are also resistant to the majority of tropical diseases and parasites (Roets, 2004).

However, a significant aspect that averts growth in the indigenous goat industry is that goats are usually kept as a source of food and cultural practices, thus their commercial value is not optimized in contrast to well-managed commercial farming systems.

To commercialise the indigenous industry, farmers need to see their goats as a source of income. The advantage of indigenous goats is their resistance to diseases and adaptability in unfavourable grazing conditions. Because of the small stature, adaptive feeding behaviour and extensive management they are profound option in ameliorating household cash flow and resolve food security issues.

1.2 Introduction

Livestock production is a significant agricultural activity in most villages in South Africa depending on environment and level of management. Indigenous goat production is often practiced under hazardous and unstable production conditions and threatened by bush encroachment and land degradation (*Braker et al, 2002).*

The role of goats in traditional areas has been recognized. Goats similarly to cattle play a significant role in the livelihood of rural people in communal farming systems. Indigenous goats are common to communal areas because they constitute genetic resource because of their ability to adapt to harsh climatic conditions, use limited and often poor quality feed resources effectively and their resistance to a wide range of diseases like pulpy kidney, gall sickness and internal parasites. They are prolific and require low inputs for moderate level of production (Ubos, 2009).

1.3 Problem statement and justification

According to Coetzee (2005) commercial value of indigenous goat meat is limited to only a few live sales (auctions) and informal markets. There's limited exposure for communal farmers. The indigenous goats' industry is not as vast as pork or beef and also lamb thus cannot directly compete within the markets and privileges they enjoy.

Consumer preference, low productive indigenous breeds, feed availability and quality management constrain goat productivity. Price variability shortage of marketing support services, market information, absence of effective producer organizations at grass roots and limited access to proper markets provide inadequate opportunities for increased incomes. The

indigenous goat farmers do not see the opportunities in this enterprise, in contrast to commercial production objectives that put emphasis on producing for markets.

Hence indigenous goat farmers keep animals as a symbol of wealth in-kind; they only focus on monetary values limited to: subsistence, petty cash for medical bills, children's education and other occasional household needs (Djamen et al 2008). This situation leads to erratic supply and price disincentive for producers despite government efforts to commercialize indigenous goat production. As such communal goat farmers have not responded to demand due to limited understanding of circumstances to take advantage of market price incentives.

The study aims to benefit farmers by providing them with understanding on the concept of commercializing indigenous goats. Farmers are often resistant to produce for markets and rely on goats as a cash flow stance. The farmers will be able to rear their indigenous goats for a specific purpose to sell them in goat's auctions. This study will educate the smallholder farmers towards proper livestock management such as record keeping, dentition (age), kidding, mortalities etc. The benefits of the conducted study will enable the indigenous goat farmers to contribute in increasing demand for chevon.

1.4 Objectives of the study

The aims of the study were to:
1.4.1 Understand smallholder's farmer's attitude towards commercialization of indigenous goats.
1.4.2 Establish challenges facing farmers and the sector in improving the state of indigenous goat production.
1.4.3 Describe socio- economic characteristics that affect and influence market perception of small holder goat farmers.

1.5 Hypotheses

1.5.1 Small holder farmers have a negative attitude to the commercialization of indigenous goats.
1.5.2 The constraints in marketing of indigenous goats or rather lack of it have an adverse effect on small holder farmers.
1.5.3 Indigenous goat's sales rate is positively or negatively affected by the distance to markets and access to market information; goat's prices offered to farmers positively influence the sales rate and the will to produce for the market.

2. LITERATURE REVIEW

2.1 Indigenous goat's production in KwaZulu-Natal (KZN)

The Department of Agriculture and Rural Development (DARD) through goat industry promotes goat production with emphasis on western breeds and not so profound on indigenous goats. The agricultural sector has confirmed goat production as a fast-growing animal production industry in KZN. The industry has been encouraged to commercialize in order to improve the quality of life for the people in terms of; poverty alleviation, food security, income generation and as a drive towards self- sufficiently in production of indigenous goats and their secondary products (Thompson, 2012). Livestock development policy puts emphasis on commercialization of goats

in order to generate employment opportunities and achieve food security in rural areas. This initiative includes persuading small holder farmers to expand beyond rearing livestock and to go onto the meat processing level (Goitom, 2009).

Many small-holder farmers keep indigenous goats for meat consumption and cultural purposes. This has been advantageous since it has easy management in terms of feeding and treatment expenses (Masuku, 2011).

2.2 Commercialization of indigenous goats in KZN

According to Dlomo (2018) the commercialization of indigenous goats will be highly beneficial to rural agriculture; this initiative will aid food security and poverty eradication in the rural areas thus the whole country. He further noted that the information is new however farmers have received adequate training on rearing goats for commercialization towards processing of goat meat and by-products (hides).

3. METHODOLOGY

3.1 Research design

The study used a descriptive quantitative design. It sought to understand smallholder farmer's attitude towards commercialization of indigenous goats and further identified constraints faced by farmers in the commercialization of indigenous goats.

3.2 Sampling and data collection

This study was conducted in the Umvoti Local Municipality (in three wards namely: ward 6, 12 & 14) under Makhabeleni and Mabomvini Tribal Authorities. These are a rural areas and the agricultural pressure is very high on the land. Goats roam around freely (free range/ extensive system) in the presence of the herdsman and browse during the day and locked in kraals at night. The target population for the study was 100 active smallholder farmers of Umvoti Local Municipality that have been trained by the department of agriculture on commercialization programme. Samples of 65 farmers were sampled utilizing a stratified random sampling technique. Data was collected using personal interviews with an aid of a structured questionnaire.

4. RESULTS AND DISCUSSION

4.1 Characteristics of Respondents

Table 1 illustrates the number of respondents according to gender, level of education, marital status and age. Of the 65 sampled smallholder farmers interviewed, 61% were males and 38% females, the main reason being the high levels of unemployment, lack of equity and that livestock production or farming in rural areas is frequently associated with males. The findings in Table 1, also illustrates that 36% of the smallholder respondents were farmers above 60 years old. According to results of the descriptive statistics in table 1; only 6% were single, 75 % married and 18%. The results only show that 15 % didn't have formal education while 46% attended up to secondary level of formal education and only 8% attended tertiary education.

Table 1: Characteristics of Respondents

Variable	Frequency	Percentage
Male	40	61
Female	25	38
Age		
18-30	2	3
31-39	6	9
40-49	15	23
50-59	18	27
Above 60 years	24	36
Marital status		
Single	4	6
Married	49	75
Divorced	0	0
Widowed	12	18
Educational level		
Primary	20	31
Secondary	30	46
Tertiary	5	8
None	10	15

4.2 Constraints in commercialization of indigenous goats in Umvoti Local Municipality

Table 2 and figure 1 shows that the main constraints in the commercialization of indigenous goats in rural areas are theft which is 90 %. The secondary challenge on the conducted study is consumer preference of meat (chevon) at 65%, cultural beliefs for commercialization of indigenous goats were 70% according to the conducted study. The transport challenge was 60%. This is due to the secluded nature of the rural areas under Umvoti Local Municipality. The indigenous goats are commonly resistant to many endemic diseases as they are well adapted to harsh conditions hence were only found to be 10%.

The frequency ratio was calculated to depict the most common factors affecting commercialization and theft was found to be at the peak. In figure 1 the y axis symbolizes the frequency (most common factor) adversely affecting commercialization. The x axis is the percentages (%) according to which factor affects commercialization the most.

Table 2: Constraints towards commercialization of indigenous goats.

Constraints towards commercialization of indigenous goats		
Percentage %	**Factors**	**Frequency ratio (%/100*65 farmers)**
90	Theft	58.5
80	Preference	52
70	Culture	45.5
60	Transport	39
50	auction sale/ markets	32.5
30	Other	19.5
10	Diseases	6.5

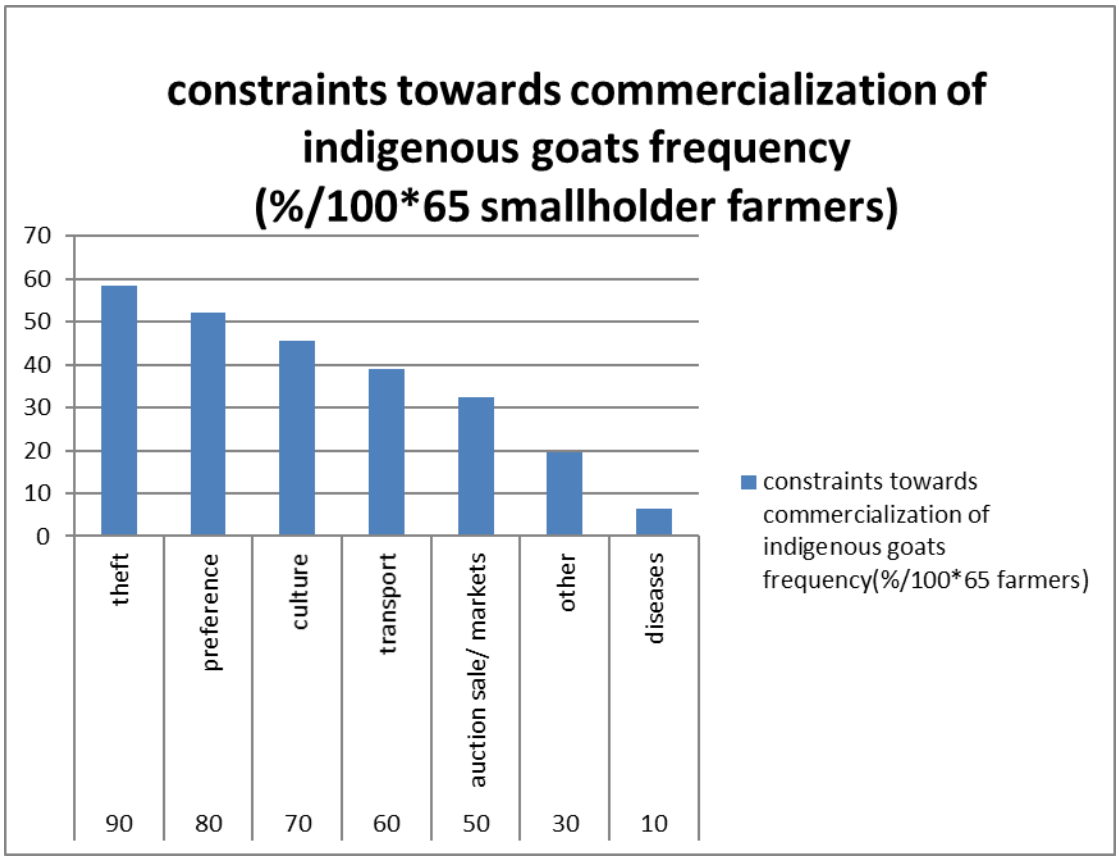

Figure 1: Constraints towards commercialization of indigenous goats according to 65 smallholder farmers interviewed and assessed.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

The study has shown that commercialization of indigenous goats was affected by several factors namely, theft, consumer preference, culture, and diseases at the very least. Small holder farmers do not see the potential to commercialize; they keep goats as a symbol of wealth (social status) in

kind and thus have not realized it as an avenue for production and profits. Lack of knowledge and information hinder farmers to exploit the opportunities available.

5.2 Recommendations

The results have illustrated that the major constraint is theft. This is due to the extensive nature of rearing practices in rural areas. Government funding with fencing aid can ameliorate results and aid kerb theft of stock.

Community base anti stock theft supported by police initiative can reduce theft of goats in the rural areas.

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Back to Table of Contents

COMMERCIALISATION OF MQANDULI MAIZE PROJECTS TOWARDS POVERTY ALLEVIATION (KSD LOCAL MUNICIPALITY) – A CASE STUDY OF MQANDULI RED HUB.

Magqaza, T. V.[8]

1. INTRODUCTION

Maize farming is identified as the agricultural enterprise with the most likely chance of improving household food security. It is also seen as a key to addressing poverty alleviation and it is an important contributor to total food production in communal farming areas of South Africa.

It is a very important component of the agricultural economy in most developing countries. Commercialisation – introducing new product making it available to the market into phases from initial introduction of the product through its mass production and adoption.

RED Hub – Rural Enterprise Development Hub.

Secondary co-ops were responsible for taking maize from the primary co-operatives and sending it to the mills for processing into samp, stock feed and bran, which would then be sold. Partnership with the farmers in which it was agreed that there would be a 25% charge to be paid by co-operatives for inputs like fertilizers and diesel for the tractors used to plough the field.

2. OBJECTIVE

Improving livelihood of members who are the beneficiaries of the primary co-operatives by commercialising their produce.

3. RED HUB ESTABLISHMENT

Mqanduli Red Hub is situated in KSD Local Municipality, Mqanduli area under OR Tambo District Municipality in the Eastern Cape Province. Started operation during December 2014. During 2015, six primary co-operatives were involved with land contribution of 1000ha assisted by ECRDA forming secondary co-operative. Social facilitation and pre- feasibility studies were conducted.

Infrastructure development (trading centres, grain storage silos, weighbridges and milling plants) and mechanization units with new eight tractors, one-ton bakkie two trailed harvesters and implements have been established to boost agricultural production and value addition. The three elements of Red Hub are production, processing and marketing which make up the value chain of the rural economy. About 70% of employees being directors and employees are from the

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primary co-operatives. Farmers were working individually since they have no market but currently combined as and form co-operatives under Red hub.

4. PRIMARY PRODUCTION PROCESSES

Social facilitation is conducted using meetings and roadshows on the identified areas where there is interest and high potential in crop production. After the community members agreed to be part of the programme, they are contributing with ± R1800.00 per hectare depending on the mechanization steps to be performed in his/her one-hectare land. After due date of contributions, they wait for production inputs. Soil preparation starts doing all the practices (ploughing, disking, planting and spraying). During harvesting produce is taken to the Red Hub whereby the field supervisor is responsible to record the produce sent from projects.

ARRIVAL AT THE HUB PROCESS

Maize is taken to the weigh bridge to get net weight by subtracting the weight of the truck after offloading to that of the full truck with maize inside. Then maize is taken to offloading pit whereby it's taken through to the silos whereby the bob system is reading how much maize is loaded in and out of the silos. Before entering the milling site health and safety measures are practiced by wearing overalls, head wraps and masks. Maize from the silos is taken to the intake bins for cooling, regulator system cleans maize before the milling process. Maize then is taken to different milling site one for animal feed and the other for maize meal and samp. After milling of maize meal vitamins are added into then moisture is tested before packaging then stored as 10kg, 12.5kg maize meal and 35kg bran.

5. MARKETING STRATEGY

ISPAZA doing branding of 10 – 12.5 kg maize meal and 30kg bran. Their current market is local, selling mostly at pay points and local shops. MOU to be signed with Department. of Social Development for bulk buying of 3tons per month in maize meal and samp. Roadshows in place to access more markets. The Red Hub buys produce from farmers around and outside KSD according to SAFEX price. MOU with Lithabo in place for marketing.

6. IMPACT OF RED HUB IN COMMERCIALISATION OF PROJECTS

Contributes significantly in the food security of the Mqanduli Local Municipality and the surrounding areas. Beneficiaries produce minimum of four tons/ha from one ton. A 1000ha are cultivated per year through assistance of ECRDA program.

They had only 20 workers but currently having 53. The running of Mqanduli milling plant by farmers, ECRDA, DRDAR, KSD municipality and other stakeholders improve the standard of living in Mqanduli communities because many jobs created, skills development provided to youth, poverty alleviated and improves the economy of KSD. Extension of primary co-operatives with potential for more production. Dividends equally shared. Sustainability of Red Hub is through proper management between farmers and extension advisors: starting from awareness of the program, mechanization, harvesting to marketing. Projects used to produce for consumption

and animal feeding only. They used to return maize to their homesteads before selling surplus if any.

7. FINDINGS

More farmers and communities are willing to participate in the project if fencing can be provided.
The offer of more ha for the project needs increase from 1000ha to 2000ha for many farmers to participate. Fencing of arable lands to avoid livestock invasion. Employment of marketing personnel had major impact on sales increase. Need for training and other capacity development programmes such as financial management for financial stability of the Red Hub. Awareness campaigns required for increase of sales as some of new farmers lack knowledge on how Red Hub operates. Yield increase from one to at least four tons / ha as they used ox before.

8. RECOMMENDATIONS

Provision of technical training on grain production and operation of machinery in order to achieve high yields. Transfer of managerial skills among RED HUB beneficiaries as some of directors are of old age. Ensuring that co-operatives have access to more markets in addition to existing ones

9. CONCLUSION

Fencing should be prioritized in areas with interest and also in those areas of high potential for crop production as well as addressing theft.

Back to Table of Contents

EVALUATION OF AN INSTRUMENT FOR THE ASSESSMENT OF FARMING OPERATIONS TO ENHANCE COMMERCIALISATION.

Theron, J. G.[9]

ABSTRACT

Evaluation of projects to determine its essential needs has been done over years with various instruments. The instrument being used currently is based on these experiences. It seems that it has got merit and could be utilised with different farming operations. Results are only as credible as the information being used for evaluation; therefore, thorough planning is a prerequisite. An integrated system that is aligned and responsive towards growth to enhance commercialisation of farmers is required.

1. INTRODUCTION

The government's redistribution policy has undergone a number of changes since 1994. From 1995 to 1999, it was implemented by means of the Settlement/Land Acquisition Grant (SLAG), which provided a grant to poor people, usually in groups, to purchase land on the open market. In August 2001 the Department of Land Affairs (DLA) launched a revised programme, Land Redistribution for Agricultural Development (LRAD). It was made clear by the Ministry of Agriculture and Land Affairs that LRAD is primarily intended to create a class of black commercial farmers, the so-called 'emerging black farmers' (Jacobs, Lahiff & Hall, 2003). The Proactive Land Acquisition Strategy (PLAS) was launched in 2006 to replace LRAD. PLAS aims to support local government to develop area-based planning and improve coordination among the institutions responsible for land reform (Antwi & Nxumalo, 2014). The essential condition that applies at present is that state land can be leased for agricultural purposes and the duration of lease will depend on the performance of the beneficiary. Successful beneficiaries could be granted long term leases and they have the option to purchase the land at market value after the lease contract of 30 years expired.

The Western Cape Department of Agriculture became involved in land reform projects from the onset. Land reform was supported in different ways. Contributions such as technical and economic inputs regarding farm potential, content of business plans and project evaluations for pre-settlement purposes during the LRAD phase were made. Post-settlement support was the primary responsibility of every provincial Department of Agriculture. This was mainly done through the Comprehensive Agricultural Support Programme (CASP) which resulted amongst others in the provision of physical assets, agricultural inputs, market access, training, as well extension and advisory services. Support to PLAS projects are mainly conducted through farm assessments and CASP.

2. COMMODITY APPROACH AND COMMERCIALISATION

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A commodity approach is been followed with the implementation of CASP. Different committees namely Commodity Project Allocation Committees (CPAC's) were formed and formally been instituted to evaluate projects on a commodity basis. Representatives from various industries in the Western Cape are part of these committees and capacity is strengthened in this manner.

A generic instrument that formed the basis for the evaluation of projects to benefit from CASP has been provided to CPAC's. This instrument is aligned with a 'Request' form that contains the essential information to evaluate a farm as operation and business. It is the responsibility of all applicants to provide such information with the support from agricultural advisors.

Commercialisation of smallholders was encouraged by the Department of Agriculture, Forestry and Fisheries recently. The Department of Agriculture: Western Cape responded to this by selecting 50 farmers that could be in the position to benefit from such an intervention. The determination of the current situation of every farmer regarding the status of his/her operation was deemed important to identify the key areas where support would be most beneficial. It was decided to consolidate the generic instrument being used by CPAC's to measurements that would be more appropriate for the 50 farms because of the large extent of data and information that are available on these farms.

3. DEVELOPMENT OF AN APPROPRIATE INSTRUMENT FOR PROJECT EVALUATION

The support that was required by land reform programmes created a new environment regarding service delivery for the Department of Agriculture. Farm potential, viability studies and business plan development became priorities over a relatively short time and adjustments had to be made accordingly. One of the first challenges was to determine the content for a business plan that would provide appropriate information to guide a business strategy and farming operations as well. The same document had to supply adequate information that would make it possible to reflect on all the essential aspects concerning farming, business development and gaining of skills; all for the purpose of evaluation.

The Department of Land Affairs at that stage provided capacity mainly related to social and institutional content, while the focus of the Department of Agriculture was on the technical, economic and farm management components. These two sets of components have been incorporated into a framework and conditions according to which business plans had to comply. This led to the selection of evaluation criteria that were used for the assessment of land reform projects. Agreement was reached between these two main stakeholders on a district level that considerable weight should be allocated to factors that have to do with viability and sustainability.

A sustainability index was developed in 2003 for internal use to identify vulnerable areas in projects and to reflect on the influence that each might have on viability and long-term success. The main criteria that were selected are production, economics, social/political and environment. Some of the indicators aligned with these are: soil, climate, water, genetic material (animals/plants), input: output ratio, capital, comparative advantage, market opportunity; groups,

individuals, agricultural experience and expertise, production management skills; physical impact, social impact economic impact. The rationale behind this was to assess projects on a holistic basis which would contain all pillars of sustainability.

A checklist (Yes or No) was designed in 2006 on the basis of the sustainability index. It was however, much more aligned with the essentials and items that are applicable on farm level. The purpose stated was: "This framework should be used as a "check list" or a gap analysis. The status quo is compared with the ideal attainable within a specific time frame. The necessary actions and plans to achieve this should be reflected in a business plan." Statements that were outcomes/result based such as; "Spending of funds is based on the "right" priorities for the specific enterprise (will have the biggest impact on profitability, viability and sustainability of project – short term cash flow must be weighed against the medium and long term profitability – balance – *check with agricultural economist*)", were used to assess projects on a range of pertinent items. In practise it became a very useful instrument for planning because it provided guidance to the agricultural advisor that was challenged at that stage to present information on all the fundamental aspects of farming and not to render technical advice to farmers only.

In retrospect it still seems to be a useful instrument even at present, because apparently the fundamentals of farming development have been captured in a condensed, descriptive manner which is quite easy to understand but quite difficult to evade. This formed the basis of an evaluation instrument used on district level in 2007 and the precursor for the generic evaluation instrument that was completed in 2011 and subsequently provided to CPAC's. The latter is a rather comprehensive framework that provides a structure for the evaluation of 27 described indicators under the following headings: Natural resources/Production; Financial/economics; Environment; Legal and Regulatory aspects; Management. Further to this it requires a rating for the impact of the proposed funding, target beneficiaries, job creation, investment per person and grants received as well. The result is an aggregate by weighting and calculation.

4. INFORMATION BEING USED FOR ASSESSMENTS OF PROJECTS

LRAD projects were evaluated with the information in business plans according to a prescribed format and content. Service providers were involved in the compilation of these business plans and regularly a significant part of such documents included motivational or other content that was not necessarily required for assessment. This was not totally unexpected because the main purpose of such as business plan was to get approval for the purchasing of a farm. These documents could be rather bulky and in such cases, it took much effort to locate the essential information that is needed for evaluation. The same trend was evident in the initial stages of CASP because its primary aim was to support emerging farmers during the post settlement phase. Information in the LRAD business plan consequently was carried over to inform the items that should be funded through CASP. A generic business plan structure was available for CASP projects, but it contained rather general information and it was actually more designed to facilitate effective implementation.

It became apparent that something is lacking. LRAD information was quite comprehensive concerning the viability of a farm *per se* but logically less focus was given to the support that would be been needed during the post settlement period. A checklist was introduced to improve

the planning of CASP projects on district level in 2006. Inadequate planning led to a situation where the term "wish list" was being used to describe the need or want of the farmer for items that were not necessarily a priority for the business at that stage. Items that would reap short term benefits versus investments of a capital nature that are intended to realise gains and growth in the longer term add more complexity to the situation.

Instruction was given by the Department of Agriculture in 2010 to design a "Request" form for CASP applications. The main purpose for the information gathered by this form was that it would be suitable for the assessment of projects regarding viability and to determine the priorities to be funded as well. Such a form was completed in 2011 followed by a "Checklist and Finding" in 2012 to determine if all compliances are being met. It further gave the Department on a district level the opportunity to reflect on pertinent items such as a "SWOT" analysis of the project and to make recommendations to a CPAC regarding approval thereof. Information contained in these two documents is deemed the equivalent of a condensed business plan which focuses on the essentials only. Annexures and additional information forms part thereof and depend on the profile and specific requirements of a project. This procedure is still being used at present.

5. EVALUATION INSTRUMENT FOR COMMERCIALISATION

Projects that were supported previously and which seemed relatively well established were some of the criteria being used for the selection of the 50 farms. The assessment of these projects for CASP support was done by an internal departmental committee. The instrument for assessment was adapted from the generic one being used by CPAC's as previously mentioned. The reason for this is that these farms were earmarked for commercialisation which means they should be able to sustain themselves henceforth.

The design of this Excel based instrument hinges on two main aspects namely; performance evaluation and identification of critical areas that need support. The number of indicators were reduced from 27 in the generic CASP instrument to 13. These indicators are as follows:

- Performance/growth of business past 5 years: Increase in value, volumes, production areas and capital investment is satisfactory.
- Cash flow projections: Realistic assumptions show that satisfactory growth in future is achievable.
- Financing: The business is able to provide finance from own resources or obtain finance to operate and maintain all necessary components and pay off all liabilities accordingly.
- Market arrangements: Markets are secured according to income (prices in budgets) and logistics are in place to get produce to the market with the required quality still intact.
- Crop/Livestock enterprises: All enterprises are suitable/viable and complementary, according to farm's potential and optimum level of diversification has been reached; consolidation of enterprises has taken place. Enterprises are proven by a completed number of cycles.
- Infrastructure and facilities: In place, adequate, serviceable and maintained to produce the required quantity and quality cost effectively.
- Vehicles, machinery, implements, equipment: In place, adequate, serviceable and maintained to produce the required quantity and quality cost effectively.

- Services: The required inputs and other agricultural production related services are readily and continuously available regarding all enterprises on the farm.
- Management control: Financial and production records are available and business information system is in place to inform decision-making. Labour administration is in place (SIZA).
- Permanent jobs: Additional permanent jobs that will be created.
- Seasonal jobs: Additional seasonal jobs that will be created.
- Target beneficiaries: Total percentage (%) women, youth and disabled that are beneficiaries of the project (workers excluded).
- Grants received: The percentage (%) grants already received of the total amount required to create a viable, bankable business unit (farm).

The weighting for indicators up to "Management control" accounts for 80% while the remaining 20% were allocated to the last four indicators. The first two indicators regarding growth were brought into the equation because of "Sustainable proxies" being used in the National Treasury Jobs Fund Programme (Louw, 2017). The manner in which "Grants received" is being rated has been changed to the amount of funds received to date as a percentage of the total funds that are required on a farm. This means that a project will not be penalised anymore according to arbitrary amounts that were determine for all projects, but rather according to the total capital investment that is required for the specific farm.

Rating is done on a 5 point scale (maximum) while a 3 is deemed as the minimum standard to be acquired for commercialisation purposes. Colour codes within the Excel cells of indicators are used and ratings from 3 upwards will turn it green, while 2 will be yellow and 1 will be red. Another change has been made regarding the impact of funding. Previously this was assessed on the project as a whole but now every indicator is assessed separately. The impact of funding is rated in a separate column and will only change if funds for that specific indicator will be provided. The structure of the instrument is as follows:

Tabel 1: Structur of the evaluation instrument.

Description of requirement: {The requirements that are described in this column refers to the standard or norm (=3) that must be achieved. It must be reflected in the score if it's more or less.}	**SCALE** **5 =Outstanding** **4 = Significantly above requirement** **3 = Fulfil requirement** **2 = Do not meet requirement** **1 = Poor** **0 = No information**	This is the new score after the required funding is provided for a specific item on the farm.	
INDICATOR	**CURRENT STATUS / BASELINE**	**IMPACT OF FUNDING**	Comments/Rationale for score
Infrastructure and facilities: In place, adequate**,** serviceable and maintained to produce the required quantity and quality cost effectively.	2	**3**	

6. RESULTS

The scores achieved by projects were somehow lower than what were obtained previously. This was expected because the instrument was designed to simulate a performance audit. This 'stricter' approach might have provided a more realistic perspective on the profiles of these projects so that better identification of the appropriate interventions may have taken place. Members of the evaluation committee in general share the opinion that the outcomes were a rather true and credible reflection of the profiles of the projects according to their knowledge that been accrued through the years.

7. GRADUATION INTO COMMERCIALISATION

The quality of data in the 'Request' form was strengthened through a whole farm planning exercise that preceded the completion of the form. A comprehensive framework was used to determine the status of information on all relevant aspects and lacking data was gathered where needed. Seven main items were used namely: Position, size of land, zoning; Natural resource assessment; Management units; SWOT analysis; Scenario development for optimisation; Integrated production and operational plan; Priorities for progression. This process pointed out that further engagement concerning quite a number of farms will be required to get planning on the expected standard.

All 50 farmers had to present their projects themselves and in some instances were assisted with the changing of slides only. A PowerPoint structure for a detailed presentation (according to information in the 'Request') has been provided and presentations were done accordingly. (However, the format for prioritisation was changed and only three priorities were allowed namely; 1- essential, 2 - very important, 3 – important.) Questions or clarification also had to be dealt with by them.

8. CONCLUSIONS

An instrument for the assessment of farmers to facilitate their road to commercialisation is only one piece of the process. It will have limited substance if it is not regarded a valued component of a well-designed, entrenched strategy. All the relevant components should have influence on each other to find the optimal structure, content, process and procedures. Good information flows from thorough planning and good recordkeeping. This is non-negotiable for a very competitive and rather risky business such as agriculture.

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Back to Table of Contents

THE USE OF THE PUREST™ APPLICATION TO COMMERCIALIZE SMALL SCALE SUGARCANE FARMERS THROUGH SYNERGISED EXTENSION.

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Keywords: Pur*Est*™ App, maturity, stakeholders, synergy, small scale farmers, commercialization, recoverable value.

1. BACKGROUND

The small-scale sugarcane farmers in the area of Mthwalume, South Coast of KwaZulu Natal in South Africa were having many challenges such as fires which led to them harvesting immature sugarcane. Another important challenge was that farmers are "jumping" the harvesting queue by burning their fields at the wrong time so that they can send their sugarcane to the mill first. This was due to lack of knowledge regarding the benefits of harvesting mature sugarcane. Stakeholders then got together and discussed the cause of this and came up with many solutions. One of the solutions was to make farmers aware of the losses they incur by harvesting immature sugarcane. The payment system in the sugar industry favours good quality sugarcane. It is for that reason the PurEst™ Application was introduced to determine sugarcane maturity before harvesting can take place.

2. INTRODUCTION

The development of Small-scale Farmers depends on effective transfer of technology by different stakeholders within the sugar industry. Extension stakeholders involved in the Small-scale Farmers' development are South African Sugarcane Research Institute (SASRI), Department of Agriculture and Rural Development (DARD), Miller and Grower Support organizations. A new technology transfer tools that helps to develop Small Scale Farmers is the PurEst™ App. The PurEst™ app is used to determine cane maturity and which ripener to use to enhance sugar content in the cane stalk. The stakeholders mentioned above use the PurEst™ App as an aid to commercialize Small Scale Farmers. Thus, ensuring sustainability of this group of farmers. SASRI Extension provides specialist advice on sugarcane production as a whole. DARD provides financial support for project development and one-on-one farmer visits through their Agricultural Advisors. The miller (Illovo), assists with cane deliveries and provides a guaranteed market for the farmers. Grower Support organizations provide economic support advises on financial profitability of small-scale sugarcane farmers. The synergy amongst these stakeholders is put into use through farmers' days, farm visits and industry meetings.

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3. PURPOSE

During 2016, SASRI released the Pur*Est*™ App on both iOS and Android platforms. Pur*Est*™ is a mobile application tool that allows the grower to rapidly estimate crop maturity (whole-stalk juice purity) to make ripening decisions on the farm. Pur*Est*™ can also assist with drying-off and harvesting decisions by estimating stalk moisture % and RV% so that growers can manage and prioritise fields that are ready for harvest. The different stakeholders within the Small-scale Sugarcane growing areas came together with their different skills to train and increase productivity of the Small-scale Sugarcane farmers. The agronomic (SASRI), economic (Grower Support Organization) and viability (DARD & Illovo) factors were put together in assisting the farmers.

4. METHOD

The Small-scale sugarcane farmers have a challenge with fires. They harvest their fields before maturity. This then affects their income and sustainability. To overcome this, PurEst™ App was introduced to determine cane maturity. Multiple stakeholders took part in assisting the farmers not to lose income. Canegrowers SA assisted with financial predictions on loses, Miller assisted with pre-requisites for good cane stalk that's millable, SASRI assisted with determining cane maturity on the spot and DARD assisted with one on one visits to the farmers.

The first step was to identify the targeted community of growers. This information was obtained from the local miller. The mill has this information and all the sugarcane is delivered to the local miller. In order to deliver the sugarcane, the growers have to supply the mill with the following information: copy of identification, an account number, a quota number and a map of their sugarcane farm. The mill records are correct as the growers need to be paid for the cane delivered to the mill.

The entry point into the community to start the extension programme was to engage with the social structures of the community. This was done to determine the needs of this targeted community. The most important need was for the community to get maximum income from their sugarcane delivered to the mill.

The sugarcane is harvested by using the local contractor who harvests according to a schedule accessibility and availability. Crop maturity was not a factor in harvesting. The local cane harvesting contractor is paid according to tone sugarcane delivered to the mill. Whereas the grower is paid according to Recoverable Vale (RV) content of the sugarcane. This created an opportunity for extension to get the contractors to harvest the sugarcane according RV content. There by maximising the income for the grower.

The new technology developed by SASRI Scientists enables the grower sugarcane to be measured **the brix content of the stalk** and give results for purity, RV and moisture. From this information a decision can be made to harvest or not harvest the sugarcane.

5. RESULTS AND DISCUSSION

Small Scale sugarcane farmers have adopted the App and do not harvest their cane without doing the maturity test. The number of immature cane sent to the mill has decreased which in turn increases revenue for the farmers. Sugarcane has different levels of sugar in different months of the year. In the beginning of the harvesting season (between March and June), the sugar content is low because of late summer rains. Mid-season (from July to October), the sugar content is higher because there is less rainfall in winter. At the end of the season (November to December), the sugar content goes down again because the early summer rains. This is where most farmers lose money. The PurEst™ App aims at changing that loss into a profit made by the Small-scale Sugarcane farmers. The following table illustrates the comparison between App users and Non-App users. The table clearly shows that the farmers that used the PurEst™ App had a higher recoverable value (RV%) throughout the season.

Table 1: Comparison between App-users and Non-App users.

Weeks 0- 10 (RV%)		Weeks 21 – 30 (RV%)		Weeks 31 – 40 (RV%)	
App users	Non app users	App users	Non app users	App users	Non app users
10.5 %	10.1 %	11. 7 %	11. 5 %	11. 8 %	10.0 %

6. CONCLUSION

The synergy that exists between different stakeholders has helped to commercialize Small Scale Sugarcane farmers through the use of the App. This synergy has made farmers to take their farming seriously and improved stakeholder relationship. This synergy will commercialize the small-scale sugarcane farmers by giving them high returns.

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Back to Table of Contents

ASSESSMENT OF THE ATTITUDE AND CHALLENGES TO EXPECTED PERFORMANCE OF EXTENSION AGENTS: EVIDENCE FROM ONDO STATE, NIGERIA.

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ABSTRACT

The need to ensure sustainable agricultural development through effective agricultural extension and rural advisory services for small holder farmers led to this study. This paper assesses the attitude and challenges of extension agents towards their expected performance using a case study of Ondo State Agricultural Development Programme in Nigeria. A structured questionnaire was used to elicit information from 80 extension agents (EAs) randomly selected out of the one hundred and forty-four EAs operating in the two zones of the state. Data analysis was carried out using descriptive and inferential statistics such as frequency counts, percentages means, ranks and multiple regression analysis. Results revealed that majority of the respondents were above 40 years of age (62.5%), married (92.5%), had HND educational qualification and above (97.5%), specialized in crop production (72.5%) and had more than ten years working experience (71.3%). Furthermore, the extension agents exhibited a favourable attitude towards their expected performance and the most severe constraints affecting their performance were limited number of field staff, poor motivation of workers, inadequate and unstable funds and too large area of coverage. Multiple regression analysis showed that job location, education and years of experience of the extension agents were significant determinants of their attitude to expected performance. The study recommends an urgent need for improvement in the conditions of service of extension agents through the employment of more field staff, provision of adequate and timely funding, exposure to trainings that will enhance versatility in all subsectors of agriculture and motivation of staff through various job performance incentives. This will facilitate an improvement in extension and rural advisory services rendered thus enhancing sustainable agricultural development and food security for the teeming population in the country.

Keywords: Attitude, Challenges, Expected performance, Extension Agents, Nigeria.

1. INTRODUCTION

Agriculture in Africa is undergoing a change process by numerous factors and its development is ascertained by the involvement of an effective extension and advisory services. Agricultural extension services is an educational input whose aim is to increase food production, income level and standard of living of small scale farmers and rural populace which in turn contribute greatly

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to the sustainability of Agricultural production and rural development (Adisa, 2012; Okeowo, 2015).

Agricultural extension services enable farmers and rural dwellers develop skills, knowledge and a favourable attitude towards their capability on farm practices and these skills are developed with the help of extension agents through the dissemination of innovations to farmers (Asiedu-Darko, 2013). Agricultural extension is also defined by Obiora (2013) as an educational process through which farmers and rural dwellers decision are influenced in the adoption of newly improved farm innovation which helps to improve their standard of living. Effective extension delivery system helps in bridging the gap between researchers who develop new initiatives and innovation and the farmers who are the end users of this innovation.

The performance of extension services in developing countries with respect to the transfer of agricultural technology and rendering advisory services to farmers has been said to be unsatisfactory as agricultural extension have failed to deal with specific need and problems of farmers and this has greatly affected their performances (Adekunle, 2013; Bello & Salau, 2009). Nigerian farmers pointed out lack of information and limited access to extension facilities and services as a major challenge they face in the improvement of their farm productivity (Egwu, 2014; Yohanna *et al*, 2014; Ajieh & Okoh, 2012; Otitoju & Enete, 2016). This low level of performance by agricultural extension agents might be attributed to some constraint factors hindering them from effectively playing their education and advisory role to farmers. Hence, arousing the need to assess the challenges they face in carrying out their expected role. In the light of these, this study was carried out to assess the challenges and attitude to expected performance of extension agents using a case study of Ondo State Agricultural Development Programme in Nigeria.

2. METHODOLOGY

The study was carried out in Ondo State Agricultural Development Programme (ODSADEP) in Nigeria. The state covers an area of 14,788.723km^2. It lies between longitudes $4^0$30 and 60 East of the Greenwich Meridian, $5^0$45 and $8^0$15 North of the Equator. The people of Ondo State are predominantly Yoruba and livelihood activities in the area are agricultural activities, off farm income activities and wages and salary earning jobs.

There are 144 extension agents operating in the two zones of ODSADEP. A random sampling technique was used to select 40 extension agents each from the two zones making a total of 80 respondents as the sample size. Data collection was carried out with the aid of a structured questionnaire and information was elicited on the socio-economic characteristics of the respondents, their attitude to work and constraints to effective performance. These variables were measured as follows.

Attitude to Work: The extension agents were presented with fourteen attitudinal statements about their disposition to work measured on a 5-point Likert scale of strongly agree (5), agree (4), undecided (3), disagree (2) and strongly disagree (1). The rating scale was reversed for negative attitudinal statements. A total attitudinal score was generated for each agent with 14 being the lowest and 70 being the highest score possible.

Multiple regression analysis was then used to estimate the factors determining the attitude of the extension agents to work. The explicit form of the model is specified as follows

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 \ldots\ldots\ldots BnXn + e$$

where Y is the attitudinal score of the extension agents, X is a vector of hypothesized explanatory variables which include age, gender, marital status, education, area of specialization, cadre, years of experience and job location, β is a vector of unknown parameters to be estimated to be estimated and e is the error term.

Constraints: Respondents were asked to indicate from a list of items the severe constraints affecting their performances. This was rated on a 5-point Likert-type scale of very severe (5), severe (4), somewhat severe (3), a little severe (2) and not severe (1). The actual mean is 3, thus, a mean score greater than 3 signified a severe constraint, while a mean score less than 3 signified a less severe constraint.

Data analysis was carried out using descriptive statistics such as frequency, percentages, mean, ranks, while multiple regression was used to identify the factors influencing the extension agents' attitude towards their work.

3. RESULTS AND DISCUSSION

3.1 Socio-economic characteristics of the extension agents

The results from Table 1 show that the mean age of the extension agents in the study area is 42.5 years. The implication of this is that the extension agents are energetic and can actively and diligently carry out their various tasks with the right attitude to work. This is in consonance with the findings of Idrisa *et al.* (2008) who stated that young and middle-aged individuals are found to be more active and appropriate for extension work. The result also shows that the extension agents are predominantly male (70%) which indicates an uneven distribution in the field extension workforce in the area. This result agrees with the findings of Adisa (2012) and Obiora (2013) who reported that male gender is more prominent among the field extension officers in Nigeria. This might prevent the effectiveness of rendering gender related extension and advisory services to the farmers in the study area.

The findings from the table further shows that majority (92.5%) of the respondents were married. This shows that the extension agents are responsible adults with family related responsibilities and that this attribute will most likely make them more responsible and committed to their extension duty. The table further reveals that majority (97.5%) of respondents had Higher National Diploma (HND) degree and above. This implies that the respondents are qualified for the extension job and are supposed to be well grounded in the basics of extension activities which should in-turn influence their effectiveness in service delivery. Majority (72.5%) of the respondents are specialized in crop production and they cut across different levels (cadre) of the extension profession.

Also, findings from Table 1 show the mean years of experience of the extension agents in the study area as 15.3 years. This result implies that the respondents have spent a considerable number of years of experience in extension services and they ought to have gained experiences that will enhance the effective performance of their duties with the right attitude. Eumankama &

Anyanwu (2008) and Fabusoro *et al.*, (2008) stated that the years of extension experience is a very important factor affecting the performance of field extension workers in the execution of their duties as experienced extension workers tend to perform better in the discharge of their extension duties than the less experienced ones.

Table 1: Socio-economic characteristics of Extension Agents

Characteristics	**Frequency**	**Percentage**	**Mean**
Age			
≤ 30	5	6.3	42.5
31- 40	25	31.3	
41 and above	50	62.5	
Gender			
Male	56	70	
Female	24	30	
Marital status			
Single	3	3.8	
Married	74	92.5	
Divorced	2	2.5	
Separated	1	1.25	
Level of Education			
OND	2	2.5	
HND	56	70	
B.Sc.	20	25	
Ph.D.	2	2.5	
Area of Specialization			
Crop	58	72.5	
livestock	11	13.8	
fisheries	1	1.2	
forestry	10	12.5	
Cadre			
Extension Agent	44	53.8	
Block Extension Agent	17	21.2	
Block Extension Supervisor	8	10.0	
Subject matter specialist	10	13.8	
Zonal Extension Officer	1	1.2	
Years of Experience			
≤ 10	23	28.7	
11-20	37	46.3	
21-30	19	23.7	15.3
31-40	1	1.3	

3.2 Constraints Affecting the Extension Agents Performance

The constraints affecting the performance of extension agents were presented in Table 2. Respondents were asked to indicate from a list of items the severe constraints affecting their

performances as rated on a 5-point Likert-type scale of Very severe (5), Severe (4), Somewhat Severe (3), A little Severe (2) and Not severe (1). Using the rating scale, a mean of 3 was used to identify the most severe constraints affecting the performance of agricultural extension agents in ODSADEP and these were ranked according to their order of severity. The result shows that "Limited number of staffs" ($\bar{X} = 4.8$), "poor motivation of workers" ($\bar{X} = 4.8$), "Inadequate and unstable fund" ($\bar{X} = 4.6$), "Too large area of coverage" ($\bar{X} = 4.5$), "Late delivery of farm inputs" ($\bar{X} = 4.4$), "Poor Infrastructure" ($\bar{X} = 4.2$) and "High illiteracy of farmers" ($\bar{X} = 4.2$) were the major severe constraints affecting their performance as they ranked 1st to 6th respectively. This implies that extension agents in the study area were severely faced with constraints that are serious enough to affect their effective performance in carrying out their duties. The constraint of limited number of field staff has been a major problem in the study area as it agrees with the report of NAERLS (2012). Also, Obiora (2013) pointed out that issues associated with inadequate funding and infrastructure, high extension-to-farmer ratio, inadequate remuneration are constraints that needs to be dealt with in Nigeria. Asiedu Darko, (2013) also reported that in Ghana, lack of adequate funding and low level of training in extension services are some of constraint faced by the extension agents in neighbouring Ghana. Extension agents also need to be properly motivated financially and with other job incentives as these will encourages them to improve on their expected performance as regards providing adequate education and advisory services to farmers. Saku & Bello (2009) opined that successful agricultural extension services are dependent on adequate and timely funding and proper motivation of staff.

Table 2: Distribution of the respondents according to the constraints affecting their performance.

Constraints	**Mean**	**SD**	**Ranks**

Limited number of Staff	4.8	0.48	1st
Poor motivation of workers	4.8	0.49	1st
Inadequate and unstable fund	4.6	0.52	3rd
Too large area of coverage	4.5	0.71	4th
Late delivery of farm inputs	4.4	1.17	5th
Poor Infrastructure	4.2	0.75	6th
High illiteracy of farmers	4.2	0.84	6th
Purchase and Maintenance of Equip.	4.1	0.79	8th
Poor housing facilities	4.1	0.85	8th
Lack of data about the Farmers	4.0	1.06	10th
Lack of Training of farmers	4.0	1.00	10th
Unstable government Policies	3.9	0.71	12th
Communication btw research institutions & workers	3.7	2.46	13th
Low Salary	3.5	1.23	14th
Cooperation from higher authority	3.4	1.11	15th
Problem of convincing farmers & new Tech.	3.4	0.71	15th
No Promotion	3.2	1.08	17th
Problem of mobility of field Staffs	3.2	1.22	17th
Fear of privatization	3.0	1.47	19th
Transport problem	2.9	1.27	20th
Delay in getting important letters	2.9	1.08	20th
Absence of farmers 'and their Organization	2.8	1.04	22nd
Job Insecurity	2.8	0.70	22nd
No correlation between Trainings/Workshop	2.6	0.96	24th
Money motivate than Persons	2.2	1.09	25th

N.B: MS generated from Very Severe = 5; Severe = 4; Some What Severe = 3; A Little Severe = 2; Not Severe = 1.

3.3 Extension Agents' Attitude to Work

The attitude of the extension agents to work was tested on their agreement or disagreement with a number of attitudinal statements rated on a 5-point likert-type scale of Strongly Agree (5), Agree (4), Undecided (3), Disagree (2) and Strongly Disagree (1). Using the rating scale, a mean of 3 was used as a benchmark to denote the attitudinal level of the extension agents. The results from Table 3 revealed that the extension agents showed their agreements to positive attitudinal statements such as " I always make sure there are no loose ends as regards my work" ($\bar{X}$ =4.55), " I would keep working even though I don't get the money" ($\bar{X}$ =4.43) and "Sometimes I keep myself awake at night thinking of the next days' job" ($\bar{X}$ =4.35) while on the other hand, the extension agents showed their disagreements to negative attitudinal statements such as " There are other activities more important than my work" ($\bar{X}$ =3.89), "Sometimes I feel like staying away from work" ($\bar{X}$ =3.87), "I go to work as long as transport facilities are available" ($\bar{X}$ =3.66) and "I feel somewhat offended when I'm corrected about an aspect of my work" ($\bar{X}$ =3.61). The result generally shows that the extension agents have a good and positive attitude to their work and this shows that they will be lot more effective if the severe constraints to their work pointed

out are removed because they are willing and positively disposed to their work. This agrees with Muntaka & Olatinwo (2014) who reported that extension agents have positive attitude to work in Nigeria.

Table 3: Distribution of the respondents based on their Attitude to Work

Attitude to work	Mean	SD
I usually get to work a little late	3.9	0.95
Sometimes I keep myself awake at night thinking of the next day's job	4.35	0.64
I would keep working even though I don't get the money	4.43	0.63
I always make sure there are no "loose ends" as regard to my work	4.55	1.28
I feel disappointed when I fail at something connected to my work	4.39	1.00
There are other activities more important than my work	3.89	0.45
Sometimes I feel like staying away from my work	3.87	0.33
To me, my work is only a small type of work	2.96	0.55
I am very much Involved in my work personally	1.91	1.35
I avoid taking on extra duties at work	3.41	0.92
Formerly, I used to care about my work, but nowadays Other things are more Important to me	3.79	0.63
I prefer to listen to the Opinions of others about my work	2.24	1.09
I feel somewhat offended when I am Corrected about my work	3.61	0.65
I go to work as long as transport facilities are available	3.66	0.62

3.5 Multiple regression analysis on the relation between extension agents' socio-economic characteristics and their attitude towards work performance

The result of multiple regression analysis of the relationship between the extension agents' socio-economic characteristics and their attitude towards work performance is presented in Table 5. Some independents variables were shown to be significantly related to their attitude towards their work with F value 11.75, $p < 0.01$ and R value of 0.73. The result reveals the significant related variables to be job location ($t = 2.44$), educational level ($t = 0.32$) and years of experience ($t = 0.02$). This implies that job location of the extension agents has a positive and significant relationship to their attitude to work. This implies that the closer the location of their work place,

the more their chances of having the right attitude to perform well. The positive significance of educational level and years of experience implies that the higher the educational qualification and the years of experience of the extension agents, the more they have the right attitude towards their work and thereby expected to perform well in the discharge of their duties.

Table 5: Relationship between the socio-economic characteristics of the extension agents and their attitude towards work performance

Variables	B	SE	t	Sig
Constant	56.332	7.019	8.026	0.000
Job location	0.056***	0.230	2.439***	0.017***
Age	0.055	0.096	0.573	0.568
Gender	-0.246	1.030	-0.239	0.812
Marital status	-0.296	1.303	-0.227	0.821
Education	0.263***	0.827	0.318***	0.051***
Area of specialization	-0.201	0.352	-0.571	0.570
Cadre	-0.387	0.423	-0.915	0.363
Years of experience	0.002***	0.104	0.016***	0.047***
F	11.752			
P	0.003			
R	0.729			
R square	0.531			
Adj R square	0.521			

Note: *** is at 5% level.

4. CONCLUSION AND RECOMMENDATIONS

The study analysed the attitude of extension agents towards their work as well as the constraints militating against their effective performance in Ondo State Agricultural Development Programme (ODSADEP). The findings revealed that the extension agents exhibited a good and positive attitude towards their work, however, constraints such as poor motivation of extension workers, limited number of staff, inadequate and unstable funding, and too large area of coverage accounted for the low level of performance of the extension agents in the study area.

Based on the discussions and conclusion of this study, the following recommendations were made to improve the effective performance of agricultural extension agent in the state:

(a) The state government should employ more extension agents and they should be involved in decision making and planning of extension programmes in the state.
(b) The extension agents should be adequately motivated through the provision of mobility facilities, incentives, in-service training and exposure to seminars, workshops and conferences.
(c) Needed infrastructural facilities should be made available so as to ensure effective mass media support for information dissemination to farmers in the state.

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Back to Table of Contents

FARMERS PERCEPTION OF THE IMPACT OF BUSH ENCROACHMENT AT SHESHEGU VILLAGE OF THE EASTERN CAPE.

Tokozwayo, S.[14]

THIS PAPER WAS NOT AVAILABLE AT THE TIME THE PROCEEDINGS WAS PRODUCED.

Back to Table of Contents

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THE ROLE OF GOVERNMENT IN COMMERCIALIZATION OF SMALLHOLDER FARMERS IN RURAL AREAS OF PORT ST JOHNS MUNICIPALITY: O R TAMBO REGION.

Ncedo, D.[15]

1. INTRODUCTION

List of acronyms:

AHTs	Animal Health Technicians
ARC	Agriculture Research Council
CASP	Comprehensive Agriculture Support Programme
DRDAR	Development and Agrarian Reform
DRLR	Department of Rural Development and Land Reform
EC	Eastern Cape
ECRDA	Eastern Cape Rural Development Agency
ERP	Extension Recovery Plan
FETs	Further Education Trainings
DAFF	Department of Agriculture, Forestry and Fisheries
NARYSEC	National Rural Youth Service Corps
PGDP	Provincial Growth and Development Plan
PSJLM	Port St Johns Local Municipality
SARS	South African Revenue Services
UIF	Unemployment Insurance Fund

Muyanga & Jayne, (2012) refers to Smallholder commercialization as a virtuous cycle in which farmers intensify their use of productivity-enhancing technologies on their farms, achieve greater output per unit of land and labour expended, produce greater farm surpluses, expand their participation in markets, and ultimately raise their incomes and living standards.

In most African countries, the government play a crucial role in assisting farmers with transition from deficit to surplus producers or marketing of agricultural produce. Smallholder farmers are believed to be the key drivers of many African economies (DAFF, 2012). Smallholder farmers in South Africa smallholder farmers are facing increasing market competition, not only in international markets but in local markets as well. It is a common consensus to the people of Eastern Cape (EC) that the main starting point of structural transformation of EC is broad based smallholder-led agricultural growth and commercialization. Commercialization of agriculture means production of agricultural crops for sale in the market, rather solely for family consumption. While the subsistence farming is mainly practiced by farmers mainly for own consumption. Small farm sizes, shortage of land access together with low productivity and market access challenges results in low levels of smallholder commercialization.

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Historically, smallholder farming has been undermined, while white commercial farming has been supported by legislation and subsidy. This has created a highly dualistic agricultural sector, with black smallholder farmers farming small areas of land, with insufficient investment or institutional support. MacLeod, McDonald & van Oudtshoorn (2009) said the problems facing the emerging farmers include lack of secure title to the land, lack of investment and working capital and limited access to credit, poor veld condition, highly variable climate, insufficient farm size, inadequate or damaged infrastructure, poor access to extension officers who, in turn, are often overcommitted and under-resourced, poor knowledge of resource management, and a highly competitive industry context. According to Jari & Fraser, (2013) even though the policy is now oriented in favour of smallholder farmers, they still have to compete for markets with the already developed commercial sector and for that reason, their survival in the markets is still at stake.

2. BACKGROUND OF TARGETED AREA

The Eastern Cape is located on the east coast of South Africa between the Western Cape and KwaZulu-Natal provinces. Inland, it borders the Northern Cape and Free State provinces, as well as Lesotho. The Eastern Cape's main feature is its spectacular coastline bordering the Indian Ocean. The Eastern Cape has excellent agricultural and forestry potential.

OR Tambo is one of the 7 districts of Eastern Cape Province of South Africa. The seat of OR Tambo is Mthatha. The vast majority of its 1,364,943 people speak Xhosa. The district is named after Oliver Tambo. O. R. Tambo region is located in the former Transkei region and its inhabitants are predominately dependent on the farming of cattle, maize and coffee and tea.

Port St Johns Local Municipality (PSJLM) is located in the south-eastern portion of the Eastern Cape Province, in the former homeland of Transkei. It has one town on the mouth of Umzimvubu River, Port St Johns, which is approximately 90km from Mthatha. The eastern and northeastern boundary is formed partly by the Mzintlava River and Ingquza Hill Municipality, whilst Indian Ocean is to the south and south-eastern. The western boundary is made of Mnenu River and Nyandeni Municipality

Figure 1: Picture take from The Local Government Handbook: South Africa depicting O.R. Tambo Region

3. BACKGROUND OF THE MANTUSINI DAIRY

The Eastern Cape has the smallest commercial agricultural sector. The key challenge was how to make smallholder and communal farmers commercially viable through partnerships, specialized extension support and expansion. The Mantusini Dairy project was initiated in 2005 by Nkwinti when he served as Eastern Cape agriculture MEC. It took off in earnest in 2011 when the department and its partners injected much needed support into the project. Department of Rural Development and Agrarian Reform (DRDAR) seeks to unlock agricultural potential, smallholder farmers therefore department capacitated dairy beneficiaries to regard agriculture as a business. It further enables the private sector to intervene and invest alongside with government as partners to turn smallholders into agro-entrepreneurs and subsistence and communal farms into profitable businesses.

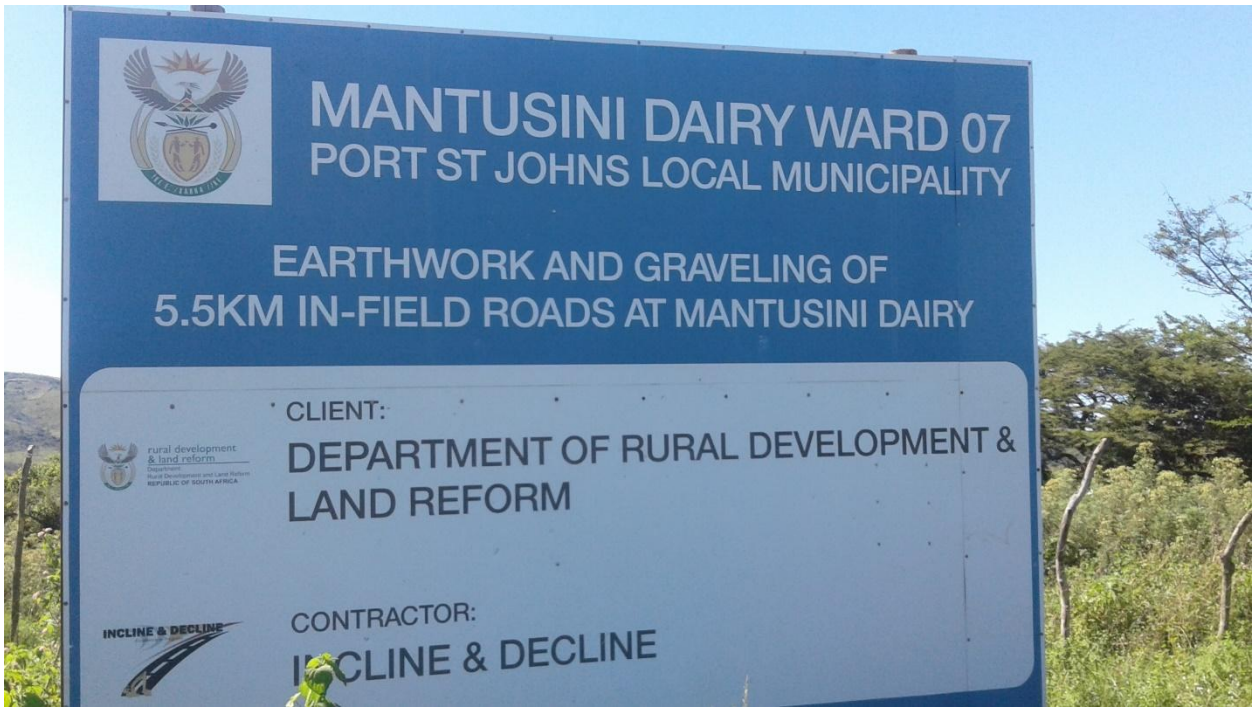

Figure 2: Mantusini Diary.

Mantusini Dairy is about 370 hectares. Out of 370 hectares 129 hectares cultivated pastures with perennial rye grass and are under irrigation using centre pivots. Currently they are only milking 240 Jersey cows. The cows are feeding with rye grass mixed with white clover and crushed maize. Sometimes dairy buys pellets to feed the cows. They are milking cows twice a day, receiving 2700 litres of milk per day.

4. COMMERCIALIZATION OF SMALLHOLDER FARMERS, A REALITY OR MYTH?

Commercialization of small holder farmers is the reality in the Eastern Cape farming communities. This will be achieved through employing Agricultural Economic Transformation Strategy. Basically, the structural transformation process will start when the broad-based agricultural growth, causes a build-up of purchasing power by a huge number of smallholder farmers. Commercialization of smallholder farmers is unfortunately facing numerous challenges such as difficulties in participating in markets, as a result of a range of constraints and barriers reported by (Abdulai & Birachi, 2008). The barriers to the commercialization of smallholder agriculture, include access to markets, access to credit, lack of institutional support, high transaction costs and lack of training etc. The commercialization of small-scale agriculture, especially in the former homelands of the Transkei and Ciskei, is captured in the Eastern Cape Provincial Growth and Development Plan (PGDP), as a key driver of local economic development, food security and rural job creation.

DRDAR recently announced that it has adopted new strategy known as Agricultural Economic Transformation Strategy. This strategy seeks to help to radically transform the agricultural sector in the province and create equal opportunities for black and white farmers who will grow the

economy together. The rural communities, or targeted smallholder/ subsistence and communal farmers are to derive optimal economic value out of their agricultural activity through customized government supported partnerships with organized commercial partners. The Agricultural Economic Transformation Strategy is strategical implemented such that it unlocks private sector investment through facilitation of partnerships between smallholder/ communal farmers and private partners. One important aspect of this strategy is to promote the use of public procurement of agricultural produce from primary producers and thereby stimulate sector growth and employment. Agricultural commercialization has been described as an indispensable pathway towards economic growth and development for most developing countries relying on the agricultural sector (Nwafor, 2015).

5. PUBLIC/ PRIVATE INSTITUTIONS

Jari & Fraser (2013) citing North, (1990), defined institutions are defined as rules of the game that facilitate coordination or govern relationships between individuals or groups. Government institutional links to the farmer must be fragmented between the different tiers of government, with their different competencies. The third level, local government, should be the most relevant and accessible to smallholders. However, in many areas it is under-resourced, particularly in appropriately skilled and visionary people. South African governments should, therefore, seriously think about investing in infrastructural development to ensure that the smallholder farmers have easy access to the market. In the absence of infrastructure, there can be no smallholder development.

According to Mangisoni (2006) government institutions are much more willing to assist farmer groups and clubs, than to individuals. As a form of collective action, smallholder farmer associations would allow reduction of transaction costs because the farmers would be able to benefit from economies of scale in marketing their crops as well as in the purchase of inputs and acquisition of information related to both production and marketing.

Here at Mantusini Dairy, there is clear prominent integration between private and public institutions. This is evident by the collaboration of Amadlelo Agri and Department of Rural Development and Land Reform (DRLR), Department of Rural Development and Agrarian Reform (DRDAR) Port St Johns Municipality (PSJLM) etc. Basically, the idea of the dairy was started by the Mantusini community, DRDAR and PSJLM, they then invited all relevant stakeholder to join in the realization of the idea. The community took their pieces of land and join it together and invite the local municipality and DRDAR, then DRDAR invited DRLR and Amadlelo Agri.

Figure 3: The pictures of the access road to the Mantusini Dairy and in-field road in the dairy

6. GOVERNMENT INTERVENTION: POLICIES AND PROGRAMS

Policy is now being orientated in favour of smallholder farmers such that highly uncertain policy environment that scares off bank financiers in agricultural sector. Consequently, there will be frustration over the private sector's apparent unwillingness to invest rapidly enough in support of smallholder agriculture. Policies enables investors to update their expectations of future prices accordingly. The failure to accurately predict near-future price movements can be a source of major risk and loss for possible financial investors be it public or private ones. Consequently, highly discretionary government policies create major risks (Poole Chitundu & Msoni 2013).

Legislation and policy require revision in order to enable a process to address and promote the combination of technical and social issues, empower farmers to choose and adopt technologies and approaches appropriate to their local circumstances. Programs encourage farmers in communal areas to negotiate with stakeholders and have understanding and participate in poverty alleviation and realization of food secured nation. If the policies are implemented haphazardly and unpredictably they tend to generate uncertainty for stakeholders and create unintended consequences for the smallholders who wish to grow and developed by investors.

The Mantusini Dairy initiative was part of the DRDAR's strategy on rural agrarian economic transformation aimed at poverty alleviation, job creation, and the creation of sustainable community-owned enterprises. But the department realized it cannot do it alone. Hence the invitation of DRLR. DRLR came on board and introduced its program. Hence now there is program operating at Mantusini village formally known as "ONE HOUSEHOLD TWO COWS". This program operates like one-household, one-hectare programme through which households are allocated one hectare portion of their land for the production of crops or pastures. Then the department gives each household two dairy cattle which will contribute to the production of dairy products.

There is a national policy on Comprehensive Agriculture Support Programme (CASP). The custodian of this program is national department of agriculture. In this programme the two

departments constructed milking parlour structure, fenced the pastures, bought tractors, car, cows, centre pivot irrigation systems, three water pumps, sheds, store rooms for feed, maize crusher to make feeds, de-bushing carried out to expand the fields for crop production and invested in capacity development of the Mantusini Dairy personnel etc. About 240 cows that are already bought. Policy and institutional reforms must be the primary targets for new strategies to enhance commercialization of smallholder farmers.

7. GOVERNMENT INVESTMENT IN AGRICULTURE-SUPPORTIVE PUBLIC GOODS

Susanna, Wentzel & Steyn, (2014) said investment is crucial to growth as it makes economies successful. Most scholars in their different research findings presented abundant evidence that indicates the efforts to improve road networks linking town to town, farming village to farming village be a cost-effective way of improving smallholders' competitive position, later on commercialization. According to results of the research showed by Dercon, Gilligan, Hoddinott & Woldehannar (2008), improving smallholder's productivity is likely to require increased commitment to investing in public goods and institutional change to promote the functioning of market-oriented production systems/ products.

Public investments can play several roles in creating the enabling environment necessary to stimulate agricultural growth. For an example the provision of infrastructure, most notably, better roads can reduce transaction costs associated with agricultural activities and in so doing have the potential to reduce the costs of acquiring inputs, to increase output prices, and more profits (Bannor, & Melkamu, 2015). Most scholars have showed in different research findings that spending government money on investments is surely better than spending on input subsidies

Government seeks to promote equitable access to land through a coordinated strategy of public goods and services investments to raise the economic participation of the land that is currently inaccessible and unutilized. This involve investments in infrastructure that link isolated areas with existing road and rail infrastructure and through similar investment in schools, health care facilities, electrification and water supply, and other public goods.

It was not different story in the case of Mantusini Dairy the departments embarked on earth working and gravelling of 5.5 km in-field roads inside the dairy. They even hold meetings with PSJLM and Department of Public works so that they could join hand and renovate the roads that joins the dairy with R61 road that like the dairy with market outlets. The dairy is still in talks with Department of Public works to revitalize the Mvume Springs Bridge that links the dairy with other adjacent pastures. Eskom was asked to installed electricity used in milking process, administration work etc. The area has Mvume Junior Secondary School and Vulindlela Senior School. There is also nearby clinic by the name of Mantusini Clinic. The dairy has clean running water.

8. GOVERNMENT INTERVENTION: EQUITABLE DISTRIBUTION OF SUBSIDIES

Access by smallholders to agricultural inputs in South Africa is generally a challenge. In blatant contrast, the commercial sector is well served by the cooperative sector and by a range of commercial enterprises which provide on-farm advisory services, frequently backed up by the capacity to deliver inputs on farm. Input subsidy programs are another major area where governments in the region have invested in smallholder productivity in order to promote commercialization (Khapayi & Celliers, 2016).

Challenges in input and credit supply among smallholder farmers reinforce negative effects on output market development. With limited financial support and minimal use of purchased inputs, farmers' marketed surpluses will be relatively small. This leads to higher risks and transaction costs for output buyers willing to purchase from smallholder farmers. The buyers will transfer the high costs to the farmers, resulting in lower profits for the farmer and hence disincentive to participate in marketing. These mechanisms made access to the market more difficult for those black producers still on the land (Oettle, Fakir, Wentzel, Giddings & Whiteside, 1998).

Agriculture is facing significant upward pressure on input costs, with simultaneous effects on the economic returns achieved in the sector, its growth and its ability to sustain jobs. Improved seeds, fertilizer, use of power machinery, and extension services boosted average yields per hectare. The involved departments reach out to ease the burden of production costs: DRDAR subsidized the cultivation of maize feed, where they in successive three years was purchasing the maize, seeds, 3 bags fertilizers as well subsidizing mechanization. DRLR, is subsidizing cattle to farm with.

9. GOVERNMENT INTERVENTION WITH PARTNERSHIPS

Achieving broad-based agricultural commercialization needs structural transformation that in turn require actions from many different kinds of actors, both in the private and public sectors. Sometimes commercialization or transformation go as far as realized with the help of international financials and donor organizations. Oettle, *et.al,* (1998) said in the right circumstances, partnership arrangements between commercial processors and smallholders can be mutually beneficial and sustainable.

Governments and private firms strategically interact and respond to each other's actions and anticipated actions. Effective coordination between the private and public sector requires greater consultation and transparency between the private and public agents. Poor coordination and policy risks could prevent the full achievement of government's aim of promoting private capital investment in value chains that make smallholder farmers to realize commercialization (Chapoto & Jayne 2009). In 1992 most of the national agricultural research functions of the Department were incorporated into the Agriculture Research Council (ARC), a statutory body formed in year 1992. However not all research personnel and research facilities were transferred to the ARC, some went to provincial departments of agriculture and consequently, all provinces have at least some research capacity. Therefore, Department of Agriculture have mutual partnership with ARC.

According to ECRDA 2012, (Eastern Cape Rural Development Agency) it is in partnership with Department of Rural Development and Agrarian Reform (DRDAR) acting as the government's

agent for performing any development-related tasks and responsibilities that the government considers may be more efficiently or effectively performed by a corporate entity; driving and coordinating integrated programmes of rural development, land reform and agrarian transformation; project managing rural development interventions; promoting applied research and innovative technologies for rural development; planning, monitoring and evaluating rural development; and facilitating the participation of the private sector and community organizations in rural development programmes.

Mantusini Dairy entered into partnership, during its inception. The partnership comprised of the 400 beneficiaries of Mantusini community with their land, DRLR & DRDAR with its funds and Amadlelo Agri who came along with skills and expertise on how to run and manage the dairy farming. These three parties signed an agreement, formally known as "Share Milk Agreement". Where the beneficiaries come with land and Amadlelo Agri come with human resource, cows, and skills. Due to later developments government departments brought the cows and infrastructure. This resulted in the reviewal of this agreement. The negotiations now are asking the Amadlelo Agri to be the mentor of Mantusini Dairy, and make sure the employees and management of the dairy are left with all necessary skills when Amadlelo Agri leaves the dairy.

10. CONTRACT FARMING

Contract system is another strategy to enhance market participation. Contract farming provides the basis for sharing values, risks and decision-making power between farmers and processors in a way that is mutually beneficial. Jari & Fraser (2013) discovered that that smallholders that have contractual agreements tend to increase participation in formal market. The contract farming has been found to play an important role in the commercialization of smallholder agriculture through the provision of an assured market, high prices, critical inputs and knowledge of new agricultural technologies for farmers as a driver of a rural development strategy. Marketing under contract guarantees the farmers with the ready market, hence it is seen as other possible institution that could transform subsistence farming into commercial farming. It is also known that it can minimize the cost of transportation and that of searching the buyers (Sigei, Bett & Kibet, 2014).

It is not different case Mantusini Dairy as the contractual agreements between the Sundale Company increased its participation in formal market. Sundale Company buys milk from the dairy, to be processed at East London where their plant is located. The Sundale Company also help the dairy with testing the quality of milk and help the dairy to keep the required standards. The Mantusini Dairy sells 8000 litres of milk twice a week, 16000 litres. The Sundale uses it truck to transport the milk. They do various products with this milk.

Figure 4: Finished products sold by the Sundale Company made by the milk from the dairy

11. ESTABLISHMENT OF INVESTMENT FUNDS.

It is frequently argued that agricultural credit can enable smallholders to make both the long- and short-term investments needed for sustainable farming. During the era of the homelands there were only very limited access to agricultural credit. The provision of credit via the state was largely confined to parastatals, which imposed strict conditions in terms of enterprise selection, and discriminated against small growers. The inability of smallholders to use their land as collateral prevented them from gaining access to funds from the commercial banks. Currently, private sector financial services are generally unavailable to smallholder farmers. The provision of support services remains one of the major important interventions in the agricultural sector.

The commercialization of emerging farmers cannot be achieved without appropriate farmer support services (Khapayi & Cilliers, 2016).

The purpose of the Development Finance directorate within the Department of Agriculture, Forestry and Fisheries (DAFF) is to ensure that smallholder producers have access to finance and that they form part of the mainstream economy. In the Eastern Cape credit to provide capital (loans) to enhance agricultural activities is rendered by Eastern Cape Rural Development Agency (ECRDA). (Antwi, Mazibuko, & Chagwiza, 2017).

The ECRDA has dedicated focus on formulating, promoting and ensuring the implementation of a comprehensive integrated rural development strategy for the Eastern Cape Province. The Entity's strategic objectives are to promote, support and facilitate rural development in the province by: promoting, assisting and encouraging the development of the province's human resources and financial infrastructure, acting as the government's agent for performing any development-related tasks and responsibilities that the government considers may be more efficiently or effectively performed by a corporate entity; driving and coordinating integrated programmes of rural development, land reform and agrarian transformation; project managing rural development interventions; promoting applied research and innovative technologies for rural development; planning, monitoring and evaluating rural development; and facilitating the participation of the private sector and community organizations in rural development programmes. The South African government has in the past few years implemented several policies and programmes as well as increased the budget spent on the agricultural sector supporting emerging farmers (Department of Agriculture Forestry and Fisheries, 2010.

The Mantusini Dairy has not yet be able to borrow or open accounts, because they are currently operating in two stages, development stage and production stage. During the inception of the dairy it was PSJLM and DRDAR who were principal funders of the dairy. The project was initiated in 2005 by Nkwinti when he served as Eastern Cape agriculture MEC. It took off in earnest in 2011 when the department and its partners injected much needed support into the project. The Department Rural Development and Land Reform is currently the main funder of the Mantusini Dairy, splashing out more than 18 million Rands, approximately 27 million on the construction of dairy parlour, in-field access roads, de-bushing Acacia Karoo trees from the fields to expand the fields for crop production, fencing boundary and pastures bought and bought some of the machinery, milking cows.

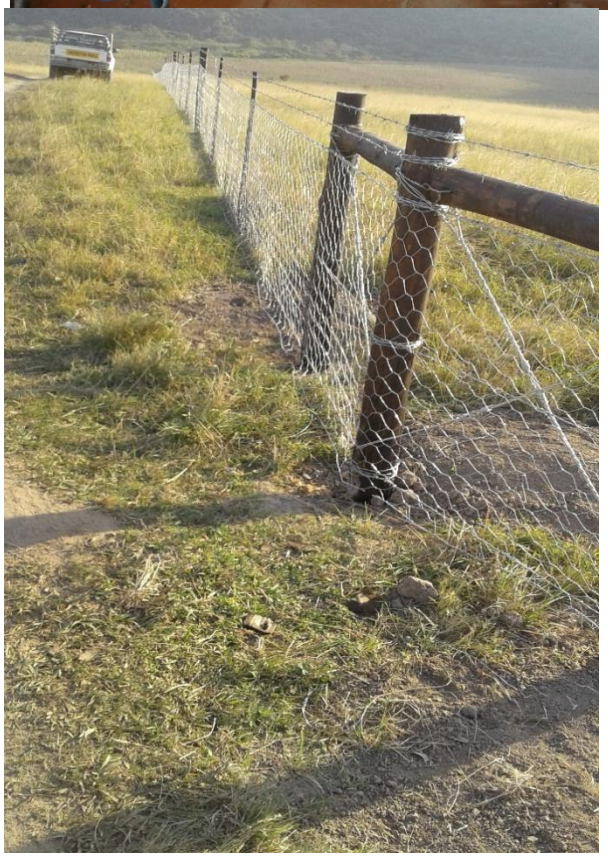

Figure 5: Investment by the funders of the Mantusini Dairy: milking parlour and fenced pastures.

12. SKILLING AND RE-SKILLING: TRAININGS

Capacity building with smallholder farmers' associations is a priority. The lack of capacity is likely to be felt particularly acutely by smallholders since they aspire to be entrepreneurs. South Africa has a wide range of institutions which offer agricultural education and training programmes such as universities, colleges of agriculture and schools. There are also a number of training organizations which are run by non-governmental or organizations. Human capacitation through trainings and education have noticeable traits towards commercialization. Farmers that have received trainings display a markedly different understanding of the challenges they face than those with farmers who have not received training (Poole Chitundu & Msoni, 2013). Farmers who have received training and have higher level of education depict desires to increase their gross margins, using certain strategies to explore higher prices. They even go as far as to even aspire to be entrepreneurs (Jayne & Muyanga, 2011). Many of the problems can be resolved only by government, but problems of resource, commodity, financial and property management can be addressed by training and support.

Generally, PSJ has low levels of literacy than any other municipality in the district. The National Rural Youth Service Corps (NARYSEC). NARYSEC programme is a 24-month skills development programme within the DRDLR which targets unemployed rural youth aged between 18 –25 in possession of Grade 12 as part of the rural economy transformation strategy from poor rural wards. The purpose of the programme is to develop the character of young people, personal and collective discipline and patriotism. Community service in the programme is compulsory to enable the programme to account for the utilization of the NARYSEC youth. Since its inception in 1 September 2010, NARYSEC has recruited 16178 rural youth in all 9 Provinces. The programme develops the skills of targeted NARYSEC participants through various skills development initiatives in partnership with other public and private sector institution in line with rural economy transformation strategy. About 2 groups of 50 children from Mantusini community were taken by NARYSEC to be trained in various agriculture related skills in different colleges like Fort Cox College and Further Education Trainings (FETs).

The admin clerk was trained by Amadlelo Agri, in all relevant administration work. Foremen and group of milkers were also trained by the Amadlelo Agri. DRDAR through its directorate of skills have taken them for trainings on agribusiness and record keeping.

13. RESEARCH AND UPDATED INFORMATION

Acquisition of agricultural related information is a serious handicap to smallholder agricultural development in Africa (Mangisoni, 2006). Farmers rely on friends, relatives and extension agents for market information. Generally, smallholder farmers possess limited technical and financial skills or knowledge of commercial farming practices, face serious challenges in their journey to commercial status. Agricultural research investments and credit subsidies yielded benefits that were 3 to 4 times the amount spent, when the improved seed varieties, fertilizer, and credit were being promoted as a high payoff technology package but subsequently had been

appeared highly ineffective over time **(**Smale, Byerlee & Jayne, 2011). Reliable researched and informed information or estimates boosts the confidence of potential investors and assist policy makers to design appropriate policies.

Government should focus on technological change to shift the agricultural production function outward. Technological change can be achieved through meaningful research. Most of the advances in breeding and biotechnology have been aimed at the large-scale farmer. Oettle, *et.al*, (1998) citing the ARC Annual Report, (1996) says highly sophisticated techniques such as genetic engineering are considered by some as automatically detrimental to sustainability and to the resource poor, leading to a reduction in market participation for them.

The Mantusini Dairy works with the DRDAR scientists, Animal Health Technicians, State Veterinarian, as well as Dohne institute of research. Amadlelo Agri have series of dairies under its supervision, so they even use data from other dairies as point of references.

14. MANAGEMENT AND MARKETING SKILLS

It is important to educate smallholder farmers on management skills, this compliment the policies which are geared towards smallholder farmers' development. Agribusiness requires some knowledge of how the commodity has been produced. All these are achievable through good management skills. Before choosing a marketing channel a farmer has to consider these costs. A business in general requires someone who is open-minded and has a quick understanding mind, skills such as record keeping and banking skills, labour management and the ability to choose a profitable enterprise and production method for that enterprise.

Mantusini Dairy is registered business entity, all its employees are registered within the prescription of the government regularities. They pay Unemployment Insurance Fund (UIF). All employees receive pay slips, their leave days are managed very well. Records are well and their books are in good standing with South African Revenue Services (SARS). They have secured market through signing the contract with Sundale Company to sell it milk. The remainder of the milk is sold to the hawkers and neighbouring households and neighbouring communities.

15. EXTENSION SERVICES/ SUPPORT SERVICES

There is much desired public and private research and extension services to serve smallholder farmers in the Eastern Cape. Ironically, studies often show that the payoffs to investment in public extension programs are often low, but this is often due to the underfunding of extension programs e.g. total lack or shortage of funds provided for extension personnel's mobility to allow extension agents to move around the district to visit farmers and perform multiple tasks that are often imposed on extension agents (Jayne, *et. al*, 2011). Therefore, each service centre is allocated, government vehicles and some extension personel have subsidy vehicles to render technical extension services. In the past decade Department of Rural Development and Agrarian Reform have been issuing bursaries to extension students. There was also national programme by Extension Recovery Plan (ERP), where the employed extension personnel were offered chance to go back to school to reskill, capacitate and develop themselves so that they are in better position to address the ever-changing environment under which smallholder farmers operate.

Training improves technically competent agriculturalists need to improve skills in participatory approaches, social and economic analysis. Investments to improve farmers' production and marketing skills are also found to be important. Antwi, Mazibuko, & Chagwiza, (2017) reckoned that extension can play a major role in enhancing commercialization of smallholder farmers in providing market information and marketing skills training.

DRDAR scientists, Animal Health Technicians (AHTs), State Veterinarian and Agricultural Advisors, are making sure of the health of animals. They are the ones who test tuberculosis, brucellosis and other infectious diseases of the herd. Amadlelo Agri also render extension services, managing the feeding programme of the cows, training milkers, recording mortality data, birth etc. Amadlelo Agri also manages the whole dairy with the aim of mentoring.

16. CONCLUSION

The smallholder farming sector is very diverse and it involves mostly black households, producing on relatively small plots of land, with limited resources for household subsistence or sale. Smallholder farming plays a major role in producing food for both rural and urban populations in providing incomes and employment.

Organized farmers with collective actions are often seen as key factors in enhancing farmer's access to reliable high value markets. Collective action is also an important strategy in agricultural commercialization because it contributes towards reduced transaction costs and it strengthens the farmers bargaining and lobbying power.

The sustainability of Mantusini Dairy requires a combination of resource conserving technologies, sustaining local institutions and an enabling environment. Improved links are needed in both directions between farmers and research, research and extension both national and provincial level research.

If appropriate policies and institutional arrangements are established and sufficiently utilized, they will yield positive results i.e. realization of commercialization by smallholders. The South African government needs to be considerate when making policies and regulation so that it ensures support and stimulate the growth even among smallholder farmers.

Given comprehensible technical packages and advice through mentorship, partnership, cause attractive prices for their products, smallholder farmers have shown a capacity to increase their contribution to the economy in a quick and efficient manner.

Helping smallholder farmers to overcome the challenges emerging farmers face can induce the farmers to move towards commercial agricultural systems. This is a necessity in order for smallholder farmers to withstand both local and international competition.

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Back to Table of Contents

FALL OF THE WORM.

Bornman, M. E.[16]

ABSTRACT

Agricultural Extension officer must have the ability to interact with farmers at all levels and by doing so build linkages between all parties. This has proved to be of great value in delivering effective services to the clients of the Limpopo Department of Agriculture and Rural Development (LDARD). The role of the Agricultural Extension officer and the support from LDARD management in the outbreak of the Fall Army Worm in the Waterberg District during 2017 are highlighted. Lastly some conclusions are drawn and some recommendations made in the combating of the Fall Army Worm.

Keywords: Extension officer; linkage; Fall Army Worm; organizational arrangements.

1. INTRODUCTION

Fall Army Worm has launched a very effective and efficient attack on some grain crops in South Africa. And it behaved like a well-oiled army. During 2016/17 the Northern Provinces was mostly affected by the worm. For purposes of this paper emphasis will be on the impact and intervention of the Limpopo Department of Agriculture and Rural Development (LDARD) in the Waterberg District of the Limpopo Province. Attention will be given to the important role of the Agricultural Extension officer and the support that is needed from Management to enable Extensioners to operate effectively during crises. One of the key aspects will be the ability of the extension officer to communicate and build solid networking systems.

Information was gathered from: reports that were submitted, statistics on number of farmers who received specific chemicals and by fellow officials from LDARD in the Waterberg District.

2. ORIENTATION

The Limpopo Province is the most Northern Province in South Africa. It is divided into five Districts and 22 municipal areas. The Waterberg District is divided into 5 local municipalities *viz* Limp 368 (former Modimolle and Mookgophong), Bela Bela, Thabazimbi, Lephalale and Mogalakwena. See the map for the geographical locality of the Areas.

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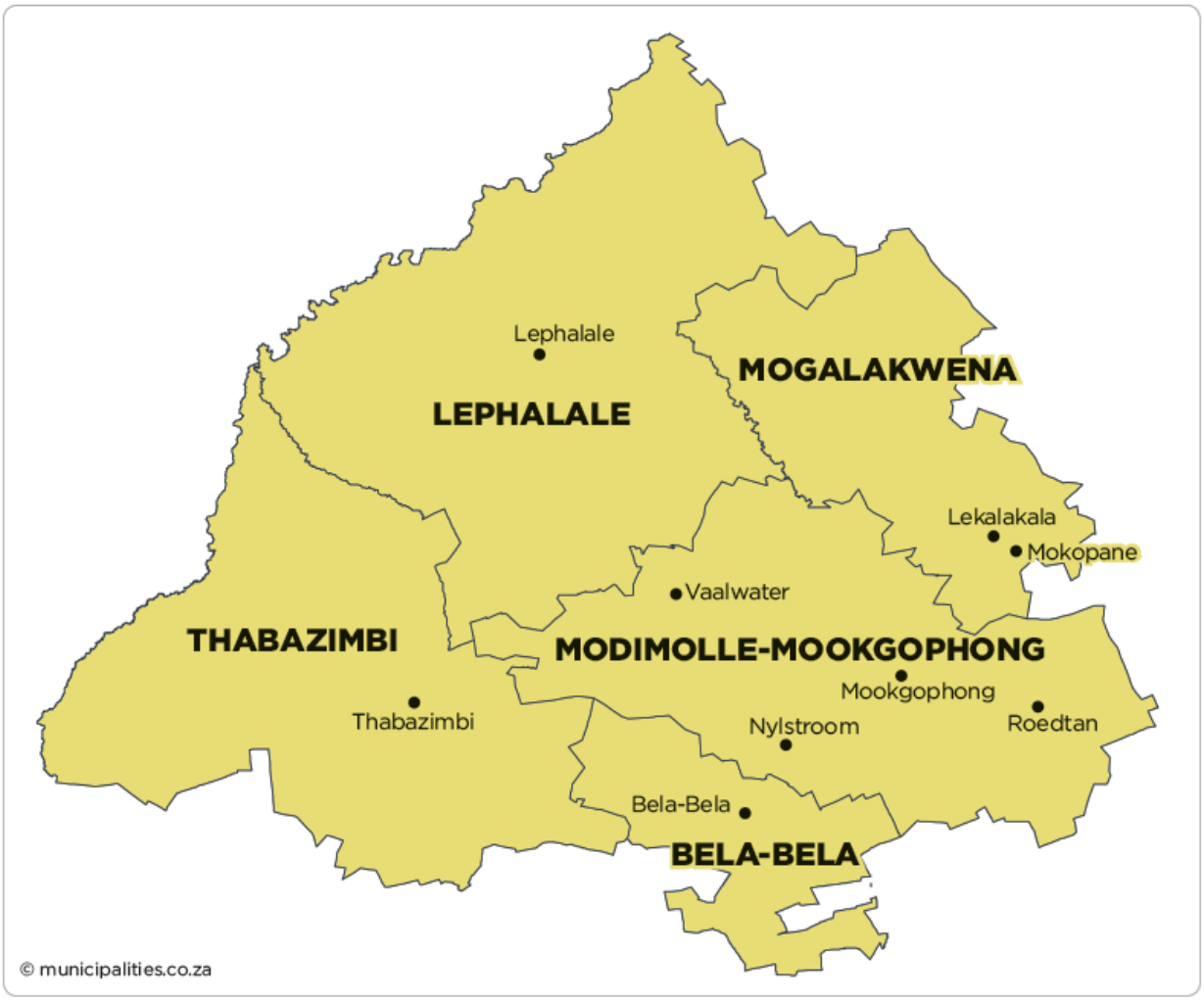

Figure 1: Map of the study area. (Municipalities.co.za. 2018)

The Limpopo Department of Agriculture and Rural Development (LDARD) vision and mission statements are as follow:
"United, prosperous and productive agricultural sector for sustainable rural communities."

"To promote food security and economic growth through sustainable agricultural development" (LDA 2014: 10)

The core values that LDARD has identified are:
" - **Professionalism:** We deliver excellent work with a positive attitude using best practice
in a professional approach
- **Integrity:** we act in an ethical manner with trust, honesty, reliability and credibility;
- **Innovation:** We continuously introduce new ways of doing our work;
- **Caring:** we want the best for our clients and staff, treat them wit respect and empathy
whilst embracing diversity; and

- **Teamwork:** we believe in the 'together we can do more' philosophy through shared visionary leadership"

(LDA 2014: 10).

3. THE WORM.

Spodoptera Frugiperda or better known as the Fall Army Worm is a Lepidoptera that belongs to the Noctuidae family. The life cycle of the Fall Army Worm is between 24 – 40 days. The moth flies mostly at night and can cover many kilometres. It is a polyphagous pest due to the damages it causes and control difficulties.

The newly hatched larvae are pale green with black head. The head turns to an orange-brown colour during the second instar. The young larvae feed near the surface of the ground during the first few days of its life. It then moves up onto the host plant and consume leaf tissue – except the veins and midrib. Larval densities are often reduced to one or two per plant. During heavy infestations larvae can exhibit cannibalistic behaviour. Fully grown lava are 2.54 to 3.84cm in length and vary in colour from pale green to almost black, with reddish-brown head. The head of the Fall Army Worm have a prominent inverted "Y" and black tubercles from which hairs arise are arrayed throughout the body. This is what distinguish them from true army worm and corn earworm larvae. Fall Army Worm pupates in the soil. The pupae can be identified by their smooth leathery skin which is reddish – brown to dark brown.

The adult moth present as follow: Adult male moth has wingspan of about 3.7cm and body length of 1.6cm. The forewings are grey and brown with triangular white spots tips. The hind wings are similar to those of the female. The Female moth has a wingspan of 3.8cm and a body length of 1.7cm. The Forewings are mottled (dark brown, grey) and the hindwings are silver white with narrow dark brown margins.

Eggs are batches covered in light brown scale hairs and are laid on the plant. Eggs are laid in batches of 20 -250 under the leaves of the host plant. The worm is produced within a few days depending on the weather. Is has a wide host range and can affect crops such as maize, sorghum, soybeans, groundnuts, potatoes etc.

It is suspected that the FAW migrate either as windborne adults or as worms transported with maize.

The damage is excessive. Larvae cause damage by feeding on the foliage of the maize and other host plants. The worm prefers soft new growth, but has also been found on the hard sunflower leaves as well.

3.1 Control / prevention

The early detection of eggs is one of the most important methods to combat the worm. Chemical spraying is most effective if worms are still small – smaller than a 10cent, larger caterpillars crawl deep into the leaf whorls of the plant and agro-chemical sprays does not reach it there effectively.

Ideally moths should be detected and destroyed before it can lay eggs on the host plants. Using a male pheromone trapping system is an effective way of determining the presence of moths in an area. The major stumbling block in this is that the moths mostly fly mostly at night and can cover large areas. They are strong flyers, so they cannot be contained in a specific area. If moths are detected one can estimate that eggs will be laid within 3 days and that they will hatch within 3 days after that depending on the weather. Eating will then commence immediately.

Over 40 Agricultural chemicals addressing 10 different modes of action has been registered for use against FAW in South Africa. Control guidelines for Fall Army worm in South Africa can be found on the DAFF website.

3.2 Distribution

First sightings of the pest on the Africa continent was in early 2016 in Nigeria. But it is possible that the pest has arrived even earlier on the continent. Sighting was also reported in Kenia and Uganda. It is estimated that the pest has invaded about 6 million square km in Southern Africa.

"The presence of FAW was confirmed in South Africa on 3 February 2017 with positive morphological and molecular identification of caterpillars and adult moths. The presence of the pest was announced on the International Plant Protection Convention's portal in terms of the South Africa's international pest reporting obligations. SADC member countries were also notified and regional control measures was discussed" (DAFF media release 11 May 2017)

4. THE ROLE OF THE AGRICULTURAL EXTENSION OFFICER

The norms and standards for Extension and Advisory service in Agriculture state the following: "In general, extension refers to a systematic process of working with farmers or communities to help them acquire relevant and useful agriculture or related knowledge and skills to increase farm productivity, competitiveness and sustainability. In practice it is a continuum, ranging from the narrow technology transfer that brings changes in farming practices without taking into account the overall societal perspectives, to advisory, education and human development where it takes on critical public priority issues" (NDA 2005 p5).

Stevens (Bornman, Nealer & Stevens, 2009: 59) commented that "… many extensionist still believe in their role as that of teaching or telling instead of creating an environment where people form effective linkages in order to help themselves". This is in reference to the important role that extensionists play and the following dimensions of his/her roles (Oakley, 1991):

- **Structuring:** The identifying of partners and the forming of internal cohesion and solidarity in some form of structure which brings people together and that will encourage continued involvement. Once the different capacities of each individual in the system is recognize the respective responsibilities and objectives will fall into place.
- **Facilitation:** This role is to empower the partners to take action and by so doing strengthening their participation. This will include acquiring specific technical skills, gaining access to resource etc.
- **Linking:** Assist in developing linkages between people with similar contexts and facing similar needs

- **Animation:** Encouraging participants to express their challenges in their own word and to help them understand that they can contribute in bringing about change.
- **Intermediary:** The fine art of bringing relevant people together and help them establish linkages and then to move away and let them proceed with the work at hand
- **Withdrawal:** Empowering people and then to let them go and to ensure that they take responsibility for the specific action.

5. INTERVENTION

DAFF has initiated a Fall Armyworm Steering committee. This technical group investigate best possible solution to combat the FAW. The members of the committee represent officials from Agricultural Research Council, Grain SA, South African National Seed Organization, South African Biological Control Organization, Insecticide Resistance Action Committee, North West University and representatives from the various Provincial Departments of Agriculture. The committee is chaired by DAFF. This committee's main mandate is to:

- Discuss and evaluate a surveillance program.
- Apply scouting methods.
- Establish diagnostic and management practices and possible intervention by Provincial Departments of Agriculture and relevant stakeholders.
- Do damage / loss assessment.
- Implement and initiate future research on the FAW.

FAW is a migratory pest, it may or may not overwinter in some parts of South Africa. Proposed interventions are capacity building, resource mobilization and intensive research.

6. FALL ARMY WORM OUTBREAK IN WATERBERG DISTRICT

The outbreak was reported in the Waterberg District of the Limpopo Province during January 2017. First sightings were on maize in the Lim 368 municipal area (specifically the old Mookophong). By beginning of February 2017, it was reported in all 5 municipalities of the Waterberg District. The impact was severe.

Farmers, seed producers and chemical representatives were all stunned. This was the first sighting of the Fall Army Worm ever reported in the area. At first, affected farmers suspected the seed producers might have supplied them with inferior seed. The chemicals which the chemical representatives prescribe did not have the required effect on the worm. This leads to the involvement of researchers at all levels. All had to learn very fast about the "new worm" pace. Farmers tried various cocktails of chemicals to contain the worm.

Communal farmers at first thought the damage was due to the drought in the various areas. Farmers concentrated on the crop where the worm was detected, only to find that the worm originated from a neighbouring crop like babala which was planted as additional fodder for cattle.

As farmers and extension officers learned more about the worm it was realized that aggressive spraying needs to take place within two weeks of each other. Different chemicals need to be

used since the worm develop resistance towards chemicals very quickly. It is critical is to spray when the worm is still very small and feeding on the leaves. The moment it penetrates the stalk of the plant it is very difficult to kill it.

Worms ate variety of plants, maize and sorghum are favourites. The worm will also eat sunflower, babala, young leaves of pecan nut trees and some young vegetable leaves.

Not all cases were reported to the Department of Agriculture in Limpopo. The table below show number of farmers per municipality in Waterberg District who reported the outbreak.

Table 1: Farmers who reported an outbreak of FAW

Municipality	**Number of Farmers**
Lephalale	8
Mogalakwena	232
Lim 368 (Mookgophong)	32
Lim 368 (Modimolle)	25
Thabazimbi	22
Bela Bela	34
Total	**353**

In Waterberg a total of 353 farmers reported an outbreak on their farms. This added up to a total of 15,422.5 ha.

7. Intervention by the Limpopo Department of Agriculture and Rural Development (LDARD).

The outbreak of Fall Army Worm in was declared a National Disaster. The National Minister of Agriculture, Forestry and Fisheries (DAFF), Mr Senzeni Zokwana and the MEC in Limpopo for Agriculture and Rural Development (LDARD), Me. Mapula Mokaba-Phukwana visited the Waterberg District on 13 February 2017. Four farmers were visited namely: Mr. Muller from Mookophong, Mr. van der Walt from Settlers, Mr. Mashishi and Mr. Bogoshi from Rust de Winter.

LDARD, in collaboration with DAFF, issued out pamphlets and launched media awareness campaign over local radio stations to create an awareness amongst farmers regarding the worm. Extension officers' visits to farmers and engaged in information sessions at each service centre area in order to create awareness. All Farmer Unions were also informed and very positive response and cooperation was received from them. Farmers were urged to report outbreaks to the local agricultural office.

LDARD purchased chemicals which were distributed to farmers. CiplaMyl90, Methomaz 900 and Ampligo was purchased and given to farmers according to a sliding scale. Most vulnerable farmers received enough chemicals to spray all their crops whereas commercial farmers receive less. Allocation of chemicals was done according to a sliding scale that was developed by the author.

According to an article which appeared in the local newspaper "Die Pos" Mr. Pretorius (a farmer from Settlers) found the following. The worms occurred on his sunflower. After a few days hundreds of sparrows was sitting on the centre pivot – feasting on the worms. It would therefore be safe to assume that there are natural predators to the worm.

During this process extension officers adhered to the guiding principles as indicated in the norms and standards: demand-driven, relevant, pluralistic, flexible and co-ordinated extension, equity, human and social capital development, participatory, priority focused, and accountability and high quality advisory service. (NDA 2005. p5)

8. LESSONS LEARNED

- This is a formidable army.
- It must be fight aggressively.
- Cultivated fields must be inspected on a regular basis.
- The worm build resistance very fast against chemicals therefore chemicals must be applied judiciously
- Use chemicals at the dosage rates recommended on the product labels.
- The worm spread very fast therefore farmers must inspect all fields, not only the current crop. They are also advised to inform neighbors when there is an outbreak so that they can be alert and spray preventatively.

- ***What does not work:***
  - Ploughing the worm into the soil;
  - Burning of the crop;
  - Spraying the same chemical over and over.

  (The worm just become dormant, wait when the climate is right and then appear again.)

9. CONCLUSION

In conclusion it must be said that this army is an aggressive one and officials and farmers has to pull together to fight. If not, Food security in the country will receive a heavy blow.

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Back to Table of Contents

GUIDELINES FOR THE COMMERCIALISATION OF SMALLHOLDER SHEEP FARMING: LESSONS FROM THE KAROO FOR FORMER HOMELANDS OF THE EASTERN CAPE.

Conradie, B.[17]

ABSTRACT

Commercialisation requires technology transfer to the smallholder sector, but it is not always clear which technologies will have the greatest impact. This is the key question investigated in this study. Production data from commercial operations were used to benchmark sheep farming in extensive grazing areas. The exercise revealed that every fifth farmer is less than 50% efficient and therefore is as much in need of extension as any smallholder might be. Experience is an important determinant of performance and could be developed in the smallholder sector through vocational training. Sheep farming is amenable to smallholder production, because it can be done successfully on a part-time basis. Woolled sheep is a winner. Being able to respond flexibly to rainfall variability is essential but there are several ways to achieve this cost effectively in the smallholder sector.

Keywords: extension plans, extensive grazing areas, sheep farming, benchmarks

1. INTRODUCTION

Results obtained under experiment station conditions take years to be fully adopted by farmers. The weaker the extension system the longer it takes. After 1994 the public extension service was made more inclusive (Department of Agriculture, 2001) and according to some became less effective (Aliber & Hall, 2012; Düvel, 2004, 2001). Therefore, this conference calling for a greater synergy between the two parts of South Africa's dualistic agriculture in extension, is quite important. The main contribution of this study is to show how knowledge about success in the commercial sector can be applied to design support programmes for commercialisation of the smallholder sector. Productivity gains are the foundation of commercialisation (Irz et al., 2001) and through benchmarking one can discover how to make it happen under field conditions. While good work is being done amongst smallholder sheep farmers in Ciskei and Transkei (De Beer & Terblanche, 2015), the region's livestock production is not yet fully commercialised (Kepe, 2000). If it was, smallholders could slaughter as many as a million additional sheep and goats per year and add ten thousand tons to the annual wool clip[18].

From the mid-2000s onwards there was rapid growth in the international literature on farm productivity. Studies on small stock rearing were concentrated in the arid parts of the European Union (Greece, Southern Italy, Spain), North Africa and the Middle East, contexts that are comparable to the Karoo and Eastern Cape. Many analyses were preoccupied with the effect of

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[18] Official statistics indicate that 17% of the nation's sheep and 44% of its goats are in the Ciskei and Transkei. Assuming that production in these areas were largely outside of commercial supply chains in 1994, the official production data for that year was inflated by the current share of the flock to estimate the impact of full commercialisation of smallholder sheep and goat production in these former homelands.

subsidies and their link with farm financial performance (e.g. Galanopoulos et al., 2011; Dinar et al., 2007; Hadley, 2006; Iraizoz, et al., 2005) but market access (Shomo et al., 2010), extension (Dinar et al., 2007), the value of farmers' associations (Suresh et al., 2008) and scale efficiency (Theodoridis et al., 2012) received attention too. In South Africa, not much has been done to date (D'Haese et al., 2001; Conradie & Piesse, 2015).

The main aims of this study are to investigate the factors associated with high productivity on commercial sheep farms and to interpret these for the smallholder sector. The benchmarking method is a four-input Cobb Douglas stochastic production frontier with inefficiency effects (Battese & Coelli, 1995), which is unfortunately quite technical. Mercifully its technical details are well rehearsed by the original authors and in most of the studies cited above so that this treatment can be kept intuitive.

2. BENCHMARKING METHODS

The practice of benchmarking is quite old, but the software to do it using stochastic frontier models only became accessible twenty years ago (Coelli, 1996). Benchmarking relies on identifying from within a sample of firms that are most technically efficient, in other words, are best at converting inputs into outputs. Once a benchmark is set, other members of the group can be ranked relative to the best performance. This ranking is done according to total factor productivity (TFP), which simultaneously considers the familiar partial productivity measures such as tons per hectare and Rand per worker et cetera. See Figure 1 for an illustration.

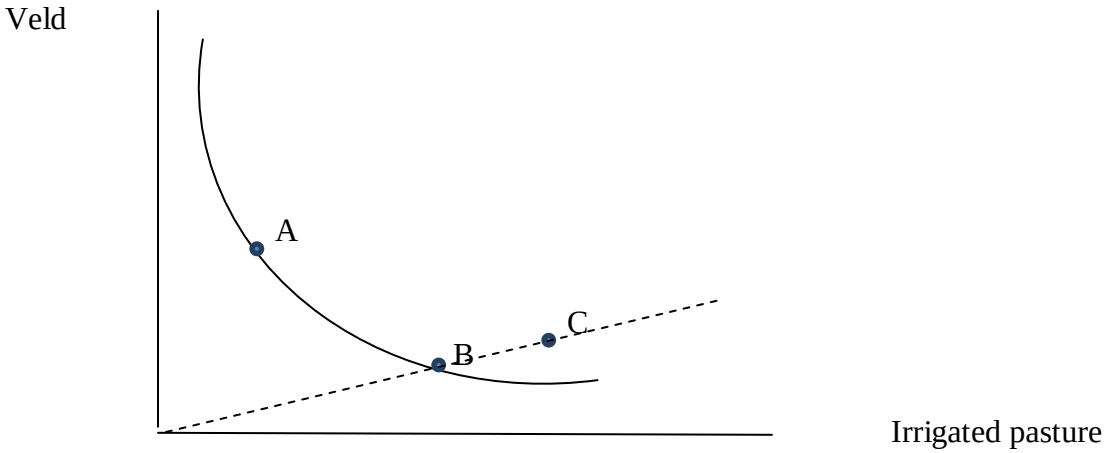

Figure 1: Efficiency rankings derived with a measure of TFP

For example, along the Great Fish River there are two modes of sheep production, one that is veld orientated (call it option A) and one that is paddock-based (option B). Let the curve (isoquant) in Figure 1 represent the minimum amount of grazing needed to support one large stock unit in this area and let the two dots represent the alternative production strategies. In this example Farm A is predominantly veld orientated with some pasture used for finishing while farm B is more pasture orientated with a lesser use of veld. Since both A and B lie on the best practice frontier they are said to each be 100% efficient. Firm C uses the same strategy as Firm B but is less efficient (perhaps because it has more problems with predators or stock theft) and so

uses 25% more of each input to produce the same stock unit of output. Relative to Firm B on the frontier, Firm C is therefore 75% efficient. Each firm to the right of the frontier can be scored in this way. If data are available for multiple years, as in this case, then all scores are relative to the best performance in the best year.

It is well known that having access to enough breeding ewes and/or land is the foundation of farming success in extensive grazing areas, but it is also true that poor grazing conditions can be offset with supplementary feeding, good genetics and sensible animal health routines, inputs that could be lumped under the heading "land enhancing inputs". Land alone is not enough either; some labour is needed and its efficiency can be improved by putting workers on horseback or quad bike. Therefore, transport cost, consisting of fuel and machine repairs and maintenance, can be thought of as a "labour enhancing input". In this model the inclusive land enhancing input was labelled "feed". The labour enhancing input was called "transport". The number of stock sheep and goats on the farm was preferred to the amount of land farmed since some farms lie fallow. The labour input was measured as the wages paid to hired labour. Together these four inputs explained livestock revenue, comprising of mutton and fibre income. All financial values were suitably inflated to constant 2015 prices using the indices published in the Abstract of Agricultural Statistics (DAFF, 2017). Each observation is at the level of the farming business, in other words it includes all properties on which a given operator farms, even rented land. Crop production was excluded from overhead costs such as transport and labour and where farm records were lacking overhead costs were apportioned according to each enterprise's share of turnover. The functional form is Cobb-Douglas, which means that all inputs and the output must be logged to fit an ordinary least square (OLS) model [1][19].

$$ln(income) = \alpha_0 + \alpha_1 ln(stock\ sheep) + \alpha_2 ln(feed) + \alpha_3 ln(labour) + \alpha_4 ln(transport) + \varepsilon \quad [1]$$

Production frontiers are estimated using a statistical model that partitions the normal independently and identically distributed error term in equation [1] into white noise (v) and an inefficiency term (-u) associated with specific farming conditions or management skills (Battese & Coelli, 1995; Conradie, 2017). It changes equation [1] to:

$$ln(income) = \alpha_0 + \alpha_1 ln(stock\ sheep) + \alpha_2 ln(feed) + \alpha_3 ln(labour) + \alpha_4 ln(transport) + (v - u) \quad [2]$$

The FRONT 4.1 maximum likelihood routine used to estimate equation [2] produces a parameter γ that captures the proportion of variance attributable to the u-component of the error term. Battese & Corra's (1977) parameterisation is used to compute γ.

$$\gamma = \frac{\sigma_U^2}{(\sigma_V^2 + \sigma_U^2)} \quad [3]$$

The inefficiency parameter, -u, is usually assumed to follow a truncated normal distribution with mean μ and variance σ_u^2. Firm level efficiency scores are predicted using the following formula [4]:

[19] Subscripts of t for year and i for farm were suppressed in the interest of clarity.

$$TE_i = \frac{Y_i}{Y_i^*} = \frac{f(x_i : \beta)\exp(v_i - u_i)}{f(x_i : \exp(v_i)} = \exp(u_i)$$

[4]

The existence of the inefficiency term, and hence of the frontier, is a matter of statistical circumstances, which must be tested for using a generalised likelihood ratio test. The LR test statistic is computed as [5]:

$$LR\ test = -2\left[LLH_{OLS} - LLH_{frontier}\right] \qquad [5]$$

LLH_{OLS} is the log likelihood statistic produced for the OLS model in equation [1] and $LLH_{frontier}$ the corresponding statistic produced when equation [2] is fitted. This test statistic has a mixed χ^2 distribution with degrees of freedom equal to the number of restrictions between the two models (Kodde & Palm, 1986). The restrictions are additional parameters in the frontier model and are not part of the OLS model, including μ, γ and η in an error components model and μ, γ and the number of inefficiency variables in the technical efficiency effects model (Coelli, 1996). The first two parameters, μ and γ, are defined above and η is a time trend that keeps track of individual farms in the panel dataset. According to Kodde & Palm (1986) the critical value for three restrictions and a probability of $p \leq 0.05$ on this one-tailed χ^2 test is 7.045.

To examine the impact of contextual factors on farm efficiency a set of farm and farmer attributes is introduced into equation [2][20].

$$ln(income) = \alpha_0 + \alpha_1 ln(stock\ sheep) + \alpha_2 ln(feed) + \alpha_3 ln(labour) + \alpha_4 ln(transport) + (v - u) \qquad [6a]$$

$$-u = \delta_0 + \delta_1 experience + \delta_2 size + \delta_3 grazing\ index + \delta_4 D\ trek + \delta_5 D\ ptime + \delta_6 \%\ woolled\ sheep + \delta_7 D\ Grootfontein + w \qquad [6b]$$

Experience, measured as the operator's years in farm management, is expected to improve productivity. Many studies proxy experience with age, but in this case actual experience in farm management is available.

Size, measured in hectares including of rented land, will improve productivity if the production system exhibits increasing returns to scale or if a larger property allows the farmer to avoid the worst effects of patchy rainfall by moving livestock around. To be suitable for smallholder production one would ideally like the system to exhibit decreasing returns to scale and / or for spatial variation to be not so important. For a Cobb Douglas production function returns to scale is found by adding up the α-coefficients on significant inputs which carry positive signs. The other variables in equation [6b] that address spatial variability in primary plant productivity are a relative grazing index and the dummy variable, D trek. The relative grazing index is based on Du Toit's (2010) method for calculating grazing potential from a moving average of annual rainfall.

[20] **Technical note**: Since equation 6b models -u, the inefficiency effect, the δs carry counterintuitive signs. For example, a negative sign on experience means that more experience reduces inefficiency, which is a convoluted (but correct) way of saying that it increases productivity. Due to the non-normal distribution of u, the magnitudes of the δs are not easily interpreted. Only their signs and significance levels matter.

Du Toit adjusts the size of monthly rainfall figures by their distance from the present using weights that increase by one twelfth for each additional month. Twenty millimetres of rain that fell a month ago gives an index value = 11/12*20 = 18.3 while twenty millimetres six months ago is worth ten index points, to reflect the falling nutritional values as the veld dries out. We averaged Du Toit's monthly index values per calendar year and compared the annual average to a long term expected value for the period 1973-2017 to calculate the percentage shortage or surplus in grazing at one of five sites through the study area. The larger the current surplus over expected conditions the higher productivity is expected to be. D trek is a dummy variable that indicates that a farmer has access to non-adjacent properties and thus the ability to move stock around to avoid the worst effects of a drought. Those who can trek are expected to be more productive than those who must stay put.

The last three variables in equation [6b] are of special interest to extension professionals. D ptime, a dummy variable takes a value of one for weekend farmers and a value of zero for fulltime operators. One would expect that fulltime operators would do better as they are specialised in farming and not consumed by other concerns. If this is the case a smallholder commercialisation programme should aim to put beneficiaries into fulltime farming by ensuring that their flock sizes are above the critical threshold and if it is not the case, a multiple livelihoods strategy should be accommodated. While the industry believes that woolled sheep's second income stream gives an advantage over mutton sheep (Snyman & Herselman, 2005) this advantage was not statistically significant in the Karoo in 2012 (Conradie and Landman, 2015). The percentage of woolled sheep variable revisits this question. Finally, the importance of training for the smallholder sector is well understood. D *Grootfontein*, a dummy variable that takes a value of one if a farmer attended this college and zero if he attended another institution or only has matric, is there to establish if a vocational training programme has a beneficial effect compared to other forms of education or lack thereof.

Equation [6] was fitted to the Central Karoo Farm Panel dataset, which collected 200 data points from 75 farms between 2012 and 2014. The data represents the region north of the Swartberg between Sutherland and the Meiringspoort road up to the Great Escarpment, an area of 1.6 million hectares that supports 193 farms (Stats SA, 2006). The 102 farmers approached by the study represents a 53% convenience sample of farming in the area. The response rate for 2012 was 70.6%. The sample suffered 2% attrition in 2013 and 12.7% in 2014, which leaves 56% of it intact after three years. The remaining farmers' land covers 66% of the sampled area and accounts for 72% of its stock sheep and goats (Stats SA, 2011).

3. RESULTS

3.1 Descriptive statistics

The average farm in the study generates an income of R614,000 per year on 9,629 hectares with a flock of 898 stock sheep and goats. Half the farms consist of at least two land parcels. At 70% of total holdings Dorper sheep dominate, followed by 29% woolled sheep (Merinos, Dohne Merinos, etc.). Since less than 5% of total holdings are goats, the discussion that follows ignores them. A total of R69,000 per year is spent on feed, animal remedies and ram purchases. Wages cost R64,000 and fuel, machine repairs and maintenance R83,000 per farm per year. The group is quite experienced, 29% underwent practical training and most are full time.

Grazing conditions varied within and between years but were normal on average. For example, 2012 was a poor season for the Laingsburg area (-29%). The next season was slightly worse than expected (-14%) and 2014 slightly better than expected in this area (+11%). In the Koup conditions were normal in 2012 (-1%), slightly above average in 2013 (+11%) and slightly below average in 2014 (-8%). Prince Albert had a bad year (-18%) followed by a normal year (+2%), followed by a very good year (+41%). Beaufort West had three good years in a row (+47%, +17%, +24%).

Table 1: Descriptive statistics (n = 200)

Variable name	Definition	Mean	S.D.
Income	Meat, fibre in 2015 R1000	614.2	666.2
Flock size	Stock sheep and goats in flock	898	924
Feed	Expenses in constant 2015 R1000	69	85
Labour	Wages of hired workers in 2015 R1000	64	58
Transport	Fuel, repairs, maintenance in constant 2015 R1000	83	69
Experience	Years in management role	19.5	12.8
Size	Size in hectares of all land farmed	9629	7204
Grazing	% over long term expected conditions	+1%	+20%
D trek	Multiple non-adjacent properties yes	47%	
D part time	Farmer holds off-farm employment yes	13%	
P wool	% of farm income from wool, mohair	28.7	40.4
D *Grootfontein*	*Grootfontein* diploma yes	29%	

3.2 The Cobb-Douglas stochastic production frontier

Table 2 presents the Cobb Douglas stochastic frontier and the results of two specification tests. The first test confirmed the existence of a frontier in the model without inefficiency effects [6a]; its test value of 157.45 rejects the null hypothesis with a probability of $p \leq 0.0001$. This confirms that γ is non-zero and that management deficiencies are detectable. The second test checks if the seven contextual values can jointly explain the observed inefficiencies. Since its test statistic of 261.11 is larger than the critical value of 16.274 for nine restrictions, the null hypothesis that an ordinary least squares Cobb Douglas function is adequate, is rejected.

Land, as proxied by the number of stock sheep on the farm, is the most important factor of production on sheep farms in the Karoo. The output elasticity was 0.598 and was statistically significant. The magnitude of the coefficient means that a 1% increase in the size of the breeding flock is predicted to raise farm income by about 0.6%. It suggests decreasing returns to scale, confirmed by the four Cobb-Douglas coefficients adding up to 0.914. Labour is the second most important input with a coefficient of 0.224, which was also significant at $p \leq 0.01$. The land and labour enhancing inputs, feed and transport, were of a similar size and quite small, suggesting that a low-cost production system is appropriate for the Karoo. The output elasticity of feed was 0.051, which indicates that if feed expenditure were to be doubled it would increase farm income by just over 5%. With an elasticity of 0.041 the transport effect was even smaller and while the feed elasticity was significant at $p \leq 0.05$ the transport elasticity as only significant at $p \leq 0.10$.

Compared to other Cobb Douglas stochastic frontiers this model produced a good fit with plausible elasticities. All four coefficients have positive signs and statistically significant, which is sometimes difficult if sample sizes are small. For example, Suresh et al. (2009) failed to produce positive signs on his three-input Cobb Douglas frontier for sheep farming in Rajasthan. Iraizoz et al. (2005) managed two positive signs out of six in their Cobb Douglas stochastic production frontier for Spanish beef production. Perez et al. (2007) excluded land and only explained Spanish mutton output with feed cost, labour and depreciation, which at least were all significant at $p \leq 0.05$. Their output elasticities with respect to labour (0.29) and capital (0.02) were similar to the ones presented here, while their coefficient on feed cost was a bit higher than this model's coefficient on stock numbers. In a Cobb Douglas stochastic production frontier representing beef cattle production in Kenya, Otieno et al. (2014) found stock numbers, feed, veterinary cost and an index of other costs all to be significantly different from zero. Hired labour is not a factor in Kenyan agriculture but the other elasticities are in line with those reported here; herds were the most important factor of production (0.89), feed and veterinary costs much less so (0.12) and other inputs quite unimportant (0.02). The Melfou et al. (2009) attempt to model a translog stochastic production function for sheep production in Greece produced the closest match for these results. Flock size was the most important (0.55), followed by feed (0.38) and labour (0.23). Labour enhancing inputs were not considered.

Table 2: Estimation results

	Coef.	SE	t-ratio	Sign.
Constant	6.081	0.334	18.2	***
Stock sheep	0.598	0.049	12.3	***
Feed	0.051	0.023	2.2	**
Labour	0.224	0.053	4.3	***
Transport	0.041	0.024	1.7	*

Constant	0.279	1.119	0.2	
Experience	-0.253	0.023	-10.9	***
Farm size	0.000	0.000	-6.8	***
Grazing index	-0.002	0.019	-0.1	
D trek	-1.412	0.805	-1.8	*
D part time	-3.114	1.307	-2.4	**
P wool	-0.035	0.008	-4.4	***
D *Grootfontein*	-2.359	0.876	-2.7	***
σ^2	5.425	1.077	5.0	***
γ	0.989	0.004	261.3	***
Observations	200			
Returns to scale	0.914			
Mean efficiency	0.666			
	Test stat.	Restricted	Unrestricted	
LR test for the frontier (3 dof)	157.45	-268.35	-189.62	
LR test for inefficiency model (9 dof)	261.11	-268.35	-137.79	

*** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.10$ σ^2 = total error variance, $\gamma = \sigma_u^2/(\sigma_u^2 + \sigma_v^2)$

3.3 Returns to scale and efficiency levels

Evidence of returns to scale in extensive livestock farming is mixed. Melfou et al. (2009) reported increasing returns to scale (1.15), Otieno et al. (2014) found close to constant returns to scale (1.03) and Perez et al (2007) produced a result somewhere between the two (1.07). Barnes (2008) reported decreasing returns to scale (0.875) for sheep farming in Scotland, a close match to what this study found (0.914). Decreasing returns to scale means that a proportional increase in all inputs results in a less than proportional increase in output, which is an essential condition for a smallholder commercialisation strategy to work.

It is standard practice to report mean efficiency scores, which in this sample was 67 ± 20%. It usually is not possible to compare scores between studies as mean scores are a function of within-group best practice. A group of mediocre firms can all end up in the vicinity of the frontier on a high mean score, which will fall when a more efficient firm sets a new benchmark. Therefore, sets of efficiency scores are at best compared in terms of their distributions, for example by looking at their coefficients of variation (CV = standard deviation / mean). The coefficient of variation of 0.30 remained stable from one year to the next but was double the CV of 0.14 reported by Hadley (2006) for sheep farming in the UK. Similar numbers of farms described the frontier in each year. There were two farms above an arbitrary level of 90% in 2012, five in 2013 and four in 2014 with a total of eight over the period. The high scores were 92%, 92% and 93%. Minimum scores were 22%, 1% and 0%, with the minimum in 2013 explained by a crop farmer who gave up his sheep enterprise in 2014 and semi-subsistence operator who were living off savings in 2014. Twelve, fifteen and thirteen farms were assigned

scores of less than 50% in the various years. The average efficiency of these forty farms was 34%, which makes them highly vulnerable if not already beyond help. If they could be convinced to accept help and if that assistance could improve their performance by half, very few firms would remain in the non-performing zone.

The contextual factors that affect this performance are summarised in the bottom half of Table 2. All seven variables carry negative signs, which means that they all contribute to productivity to various degrees. See footnote 3.

4. DETERMINANTS OF PRODUCTIVITY WITH LESSONS FOR THE SMALLHOLDER SECTOR

The benefits of experience (usually proxied by farmer age) on farm productivity is well documented in developed as well as developing countries (Hadley, 2006; Dinar et al., 2007; Shomo et al., 2010; Otieno et al., 2014) although Iraizoz et al. (2005) found it to be insignificant in the case of extensive cattle farming in Spain. In the Karoo experience is valuable. Regressing the efficiency scores on experience and experienced squared showed that each additional year of farm management experience increased productivity by 0.8 of a percentage point. One of the best ways to build experience quickly in new entrants is to provide vocational training as has been done at *Grootfontein* College in Middelburg for many years. A *Grootfontein* diploma is associated with an efficiency level of 72%, while the absence of it (because the farmer went to another college, university or nowhere at all) was associated with a 64% average efficiency. A t-test of means produced a test value of $t = -2.59$, with a probability on the one-tailed test of $p \leq 0.01$. The industry therefore has an interest in ensuring that this facility continues to be funded adequately and managed properly and is made accessible to smallholders too.

The farm size result should be read with the effects of the grazing index and the D trek dummy variable. The Karoo's rainfall is variable. Laingsburg village recorded a mean precipitation of 112 millimetres per year over the last century. With a standard deviation of 52 millimetres this series has a coefficient of variation of CV= 0.466 which is one and a half times the size of the coefficient of variation for productivity. This means that farmers have found effective ways to mitigate rainfall variability, including moving sheep around to avoid the worst droughts. The bigger a farm, the more flexibility a farmer has, which explains that productivity is positively correlated with farm size. If different portions of the farm are non-adjacent, migration benefits are compounded, which explains why the D trek dummy variable came up significant when controlling for farm size. It is interesting that the grazing index did not contribute to the explanation of inefficiency in the joint model despite a significant Pearson's correlation coefficient of $r = 0.1484$ between the index and the efficiency scores ($p \leq 0.05$). This strange result implies that within "normal" bounds farmers have worked out ways to cope with rainfall variability.

In the past, it was standard to have a spare farm at a higher altitude or across the rainfall divide to which livestock migrated seasonally. Unfortunately, due to mounting financial pressure many of these farms have been sold off, usually to weekend farmers who do not control predators. Without these farms, the remaining land becomes more vulnerable to rainfall variability and the temptation to overgraze increases. It is possible that some of the documented smallholder success

in communal areas (De Beer and Terblanche, 2015) is due to the ability to move livestock around in response to local rainfall variability. The lesson for the smallholder agriculture is that some degree of flexibility must be designed into the programme, either as large land endowments, a spare farm design where suitable land is rented by the government during droughts or by means of dedicated stock removal schemes for smallholders. These different proposals will have different cost implications that need to be examined as part of the planning process for the commercialisation of the sector.

There is some debate in the literature over the relative merits of diversification and specialisation in agriculture. Hadley (2006) reported that farms specialised in livestock are more productive than mixed operations while Iraizoz et al. (2005) and Dinar et al. (2007) insisted on the benefit of spreading agricultural risk over more than one enterprise. We also know that the size of a household's off-farm income is inversely correlated with the efficiency of its farming operation (Dinar et al., 2007), from which it could be gathered that fulltime operators might be more effective than weekend farmers. A t-test of efficiency means by D part-time gives a value of $t = 1.098$ which for 198 degrees of freedom has a probability of $p \leq 0.2735$ on the two-tailed test. The mean score of 67% for the 174 fulltime observations is no different from the mean score of 62% that applies to the 26 part-time observations. However, when controlling for the six other farm characteristics the inefficiency model says that weekend farmers do better than fulltime operators. This could be because they have more funds to invest or because they have more contacts in the wider world. The beauty of this finding is that professional people who would like to upgrade their traditional livestock holdings to commercial operations can continue in their current employment without being disadvantaged, which might generate capital to fund farm expansion as it does in Kenya where farm credit markets are missing (Otieno et al., 2014). However, this will only work if the farm is considered an important enterprise and not just a status symbol or a land grab.

The percentage of the flock consisting of woolled sheep was included to work out what the best breed is to farm with in marginal areas such as the Central Karoo. Snyman & Herselman (2005) established that Merinos perform best on stud farms in the Eastern Grassy Karoo, but (Conradie & Landman. 2015) failed to establish a statistically significant difference between woolled and mutton sheep on non-stud farms in this area arguing that the aridity of this part of the world is too much for woolled sheep. The result here is in accordance with Snyman & Herselman's (2005) finding namely that woolled sheep do reward good managers even under the most marginal conditions. It means that the wool industry is well positioned to lead a smaller commercialisation programme and that the Department of Agriculture should support a programme that makes woolled sheep available to smallholders.

4. CONCLUSION

This analysis aimed to benchmark commercial sheep and goat farming for the Karoo with the intention of transferring insights to a commercialisation design for the smallholder sector. A four-input Cobb Douglas stochastic production frontier was estimated successfully. It identified substantial room for improvement amongst a fifth of producers in the sample. The smallholder sector might be important, but the commercial sector needs ongoing support as well. Success is a function of experience and vocational training and *Grootfontein* college is a strategic asset that

could play a key role in this regard. The second important lesson was that commercial farmers seem to cope well with rainfall variability because they hold large and diversified land portfolios. While in an ideal world all smallholders would be upgraded to large-scale commercial status, neither the South African government nor the wool industry is a position to make this a reality. However, the need for flexibility can be responded to creatively in more cost-effective ways, which should be studied further. Apart from more proof that woolled sheep is a winner, other encouraging findings were that sheep production exhibits decreasing returns to scale that means it does not completely disqualify it as a smallholder enterprise, and that this enterprise can be operated as successfully on a part-time as on a fulltime basis. The latter is important because it could substantially lower the investment required to get a smallholder production programme off the ground.

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Back to Table of Contents

THE CLIMATE-SMART AND COMMERCIAL AWARE AGRICULTURAL EXTENSION PROFESSIONAL.

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ABSTRACT

Sixteen of the world's hottest years since 1860 were in the last seventeen. Greenhouse gases cause global warming and climate change. Climate change (CC) puts agriculture at crossroads. The industry must adapt in order to feed a global population projected to reach 9.8 billion by 2050 and 11.2 billion by 2100. Adapting to CC requires agriculturalists at all levels to devise appropriate mitigation strategies. Business cannot be as usual. Climate change adds complexity to agriculture. To remain relevant, agricultural practitioners must be climate-smart in order to continue producing adequate, affordable, nutritious and safe food. Further, agriculture is a business that involves inputs, outputs, profit, loss and the economic factors of production; land, labour, capital and entrepreneurship. Therefore, the astute Agricultural Extension Professional (AEP) must be conversant not only with scientific and technical aspects of agriculture, but also with the emerging challenges of CC on agriculture and agribusiness. The AEP must have relevant hard and soft skills that enable him/her to assist farmers to adapt. This paper discusses the characteristics of a climate-smart and commercial astute AEP in changing climate.

Keywords: agriculture, Agricultural Extension Professional, Change Agent, climate change, environment, global warming, mitigation strategies, science training, skills, sustainable

1. INTRODUCTION

Scientists including IPCC (2013), NASA (2016), NASA, (2018) attribute CC to anthropogenic global warming caused by greenhouse gas (GG) emissions into the atmosphere (Figure 1). The three main GGs responsible for global warming include carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Climate change puts agriculture at crossroads at a time when food production should double by 2050 to cater for growing population projected to be 9.8 by 2050 (FAO, 2010), and 11.2 billion by 2100 (Alexandratos & Bruinsma, 2012; UNDESA, 2017). The hottest sixteen years on record since the recording of temperature started in 1860 were in the last seventeen, with 2016, 2015, and 2017 being the first, second and third hottest years on record, respectively (NASA, 2018).

Therefore, there is urgent need to develop appropriate farming approaches and systems that mitigate CC. The three main actors in the agriculture continuum include: (i) farmers [communal, small scale and commercial], (ii) scientists in universities, government and agriculture industry labs, and (iii) the Extension Service with its AEPs. These actors must collaborate and work in unison. The AEP links research to farming communities through technology transfer from labs to grassroots. In other words, the AEP is a Change Agent in agriculture.

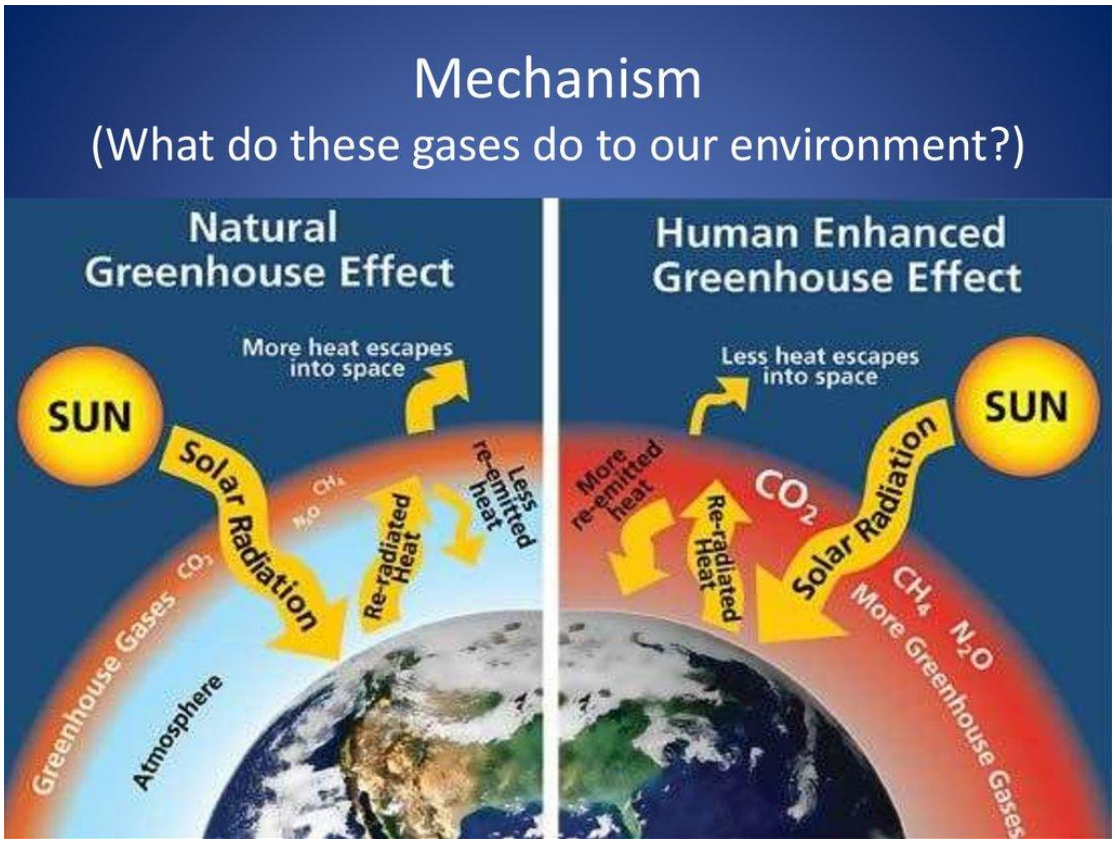


Figure 1: The causes and mechanism of global warming and climate change

The phenomenon of CC challenges agriculture, not only to be profitable, but also to be environmentally sensitive, societally responsible and sustainable. Sustainable agriculture is farming that meets current and future societal needs for food and fibre, preserves ecosystems' integrity, is healthy for lives and does so by maximizing the net benefit to society when all costs and benefits are considered (Altieri, 1996; Meissner, 2013b; Kadzere, 2018). The AEP is key to bringing CC mitigation strategies and information to farmers and to assisting them to adapt. Information on how the Agricultural Extension Services in Africa are adapting to CC is scant, which points to an incognizance of the imminent challenge. Therefore, the objectives of this study were to:

(i) Establish hard and soft skills essential for the AEP to mitigate CC, and what s/he needs in order to be climate smart and commercial aware; and
(ii) Assess best approaches to mitigate CC in an AEP's service area.

Agriculture is science in practice. Mitigating CC requires multidisciplinary scientific solutions. Consequently, we hypothesize that, the quality of scientific education, training and practice that the AEP receives is related to their ability and predisposition to contribute to mitigating CC.

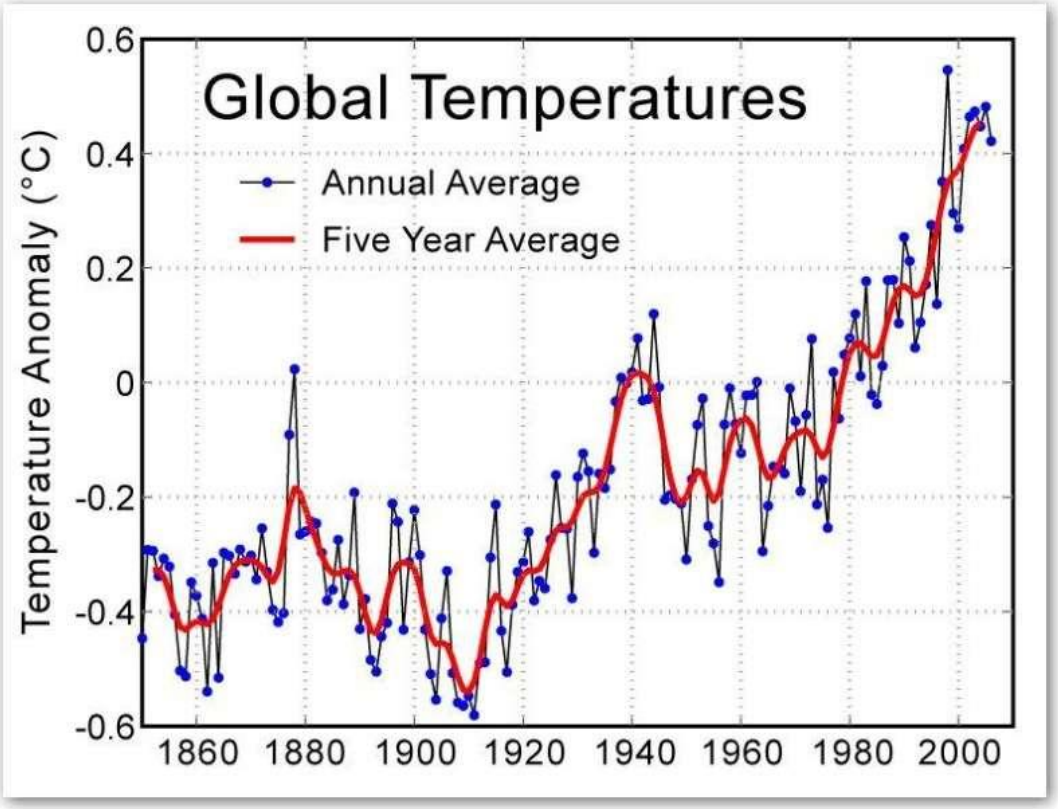


Figure 2: Global Temperatures: Sixteen of the hottest years were in the last seventeen (NASA, 2018)

2. METHODOLOGY

The education and skill sets of AEPs in Germany [DE] (Farrington, 1994; Grygo, 1996; Hoffmann, *et al.*, 2000; Hoffmann, 1996; Hausen, 1997) the United Kingdom [UK] (Bunting, 1986; Arnon, 1989; Prager et al., 2014) and the United States of America [USA] (Gardner, 1990; Mase & Prokopy, 2015; Osmond, 2010; Prokopy et al., 2015; Wang, 2014;) were critically reviewed. In addition, the authors' professional experiences were brought to bear. Agriculture in reference countries seeks to mitigate CC. We therefore used the skills of the AEP in reference countries as standard in this study. The Job Description of the AEP in South Africa at: www.jobvine.co.za/job-description/agricultural-extension-officer/ is similar to that in DE, UK and USA.

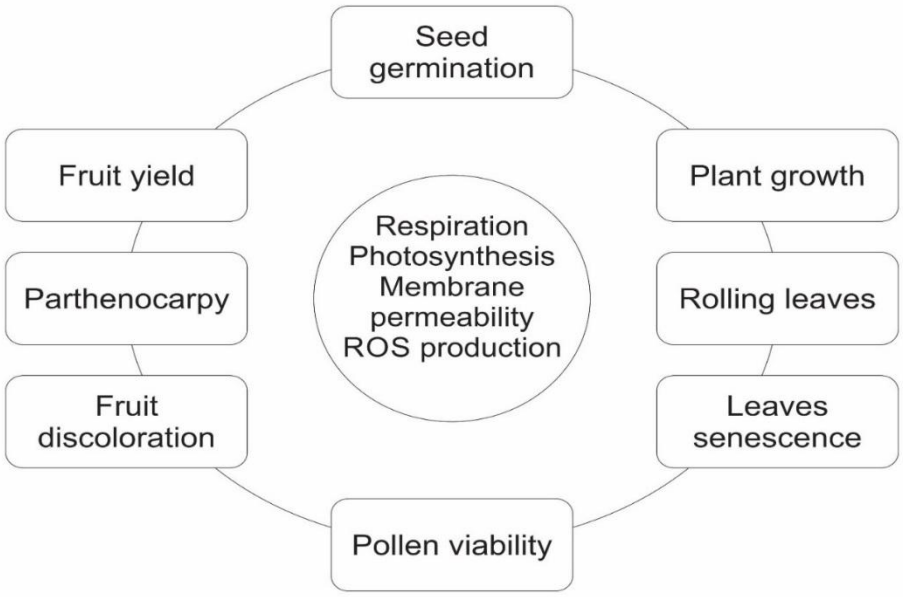
3. RESULTS AND DISCUSSION

Climate change challenges agriculture globally and more so in Africa, where skills and resources shortages aggravate the problem. Climate change will result in increased vulnerability of agriculture systems through fluctuations in seasonal rainfall patterns, increased incidence and severity of heat stress on crops and livestock, droughts, changes in vegetation hailstorms, floods, impact on soils, water (IPCC, 2013), *inter alia*. Mitigating CC needs collaboration in the agricultural continuum of extension, research and training, and in attendant administrative

service structures. The skills needed for the AEP to mitigate CC are discussed using those in DE, UK, and the USA and reference.

3.1 Hard Skills

The AEP in DE, UK and the USA have earned at least a bachelor's degree (BSc) in Agricultural Science. The majority have Master of Science Degrees (MSc), and others have Doctoral Degrees (Ph.D. / D.Sc.) in their areas of practice. These AEPs have a basic Agricultural Sciences degree as springboard to engage in Extension. Moreover, to remain competitive, the AEP in DE, UK and the USA conducts research and publishes findings in Extension Bulletins, Farming Community Popular Journals and in Scientific Journals. These AEPs have a strong science background, are numerate, analytical and contribute to generating knowledge to mitigate CC. The challenge of CC requires the AEP to have a solid scientific preparation in science including animal, crop, pasture, horticulture, soil science.



ROS: Reactive oxygen species
Figure 3: Impact of heat stress on plant production (Pampiere, 2013)

The climate-smart AEP must have solid agricultural science education to enable him/her to contribute to devising mitigation strategies. For instance, heat stress is a CC challenge to crops and livestock production. The climate-smart AEP should understand the impact of heat stress processes at molecular, organismal and production levels and its overall impact on plants as summarized in Figure 3 by (Pampiere 2013) and in animals as in Figure 4 (Kadzere, 2018). There is a huge body of knowledge on the effects of heat stress on animal production that include Badinga, et al., (1993), Bianca (1959) Collier, et al., (1982), Faquay, (1981); Kadzere, et. al., (2002) Robertshaw & Vercoe, (1980) Salem et al., (1982), and in plants (De Storme & Geelen, 2014; Hasanuzzman, et al, 2013; Matsui & Omasa, 2002; Wahid et al., 2007), among others.

However, the basic qualification of the AEP in Africa, including South Africa is a Diploma in Agriculture. Yet, the Job Description of the AEP in South Africa at: www.jobvine.co.za/job-description/agricultural-extension-officer/ is comparable to that of the AEP in DE, UK and the USA. The degreed AEP in South Africa often holds a Bachelor of Agriculture degree (B Agric.).

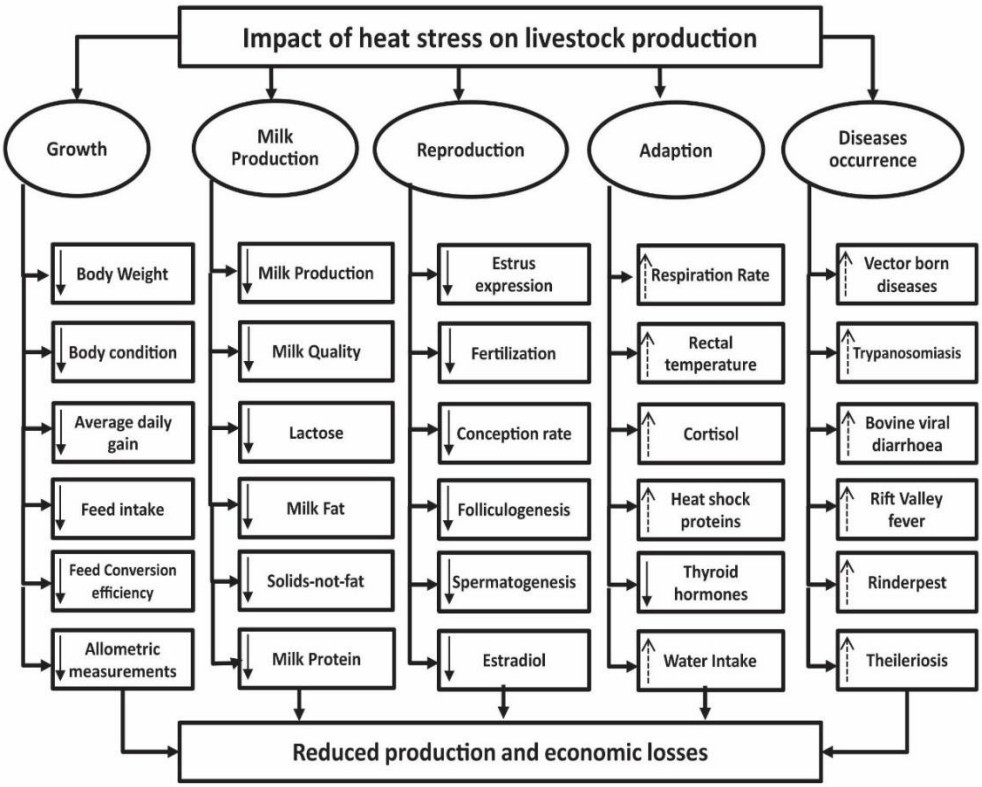


Figure 4: Impact of heat stress on animal production (Kadzere, 2018)

The B. Agric., study program teaches little science and numeracy skills, that are important in production agriculture, and more in CC. It may be pertinent for Universities, the Department of Higher Education and the National Department of Agriculture to review such study programs with the view to fortifying their scientific and practical agricultural science components, essential in production agriculture (Kadzere and Poswal, 2016), and crucial in mitigating CC. The B. Agric., study program offers Agriculture Management study program, and yet graduates from the program are mostly working as AEPs with farmers to increase production through technology transfer and are not directly involved in management. In the interim, government should alleviate the situation by assisting AEPs to develop their scientific and practical skills through on-the-job professional development and/or quality further education.

3.2 Soft Skills

In addition to the hard skills, the climate-smart and commercial aware AEP must have soft skills that enable him/her to assist farmers adapt. They include:

3.2.1 Adaptability, ability to learn and keep learning

The AEP must be adaptable in order to address agricultural production uncertainties due to CC. S/he is willing and able to learn and continue learning career-long. The ability to learn is associated with reading. Therefore, the climate-smart AEP is an avid reader of his/her subject matter and keeps at the cutting-edge of developments in the discipline. Only by keeping abreast can the AEP provide useful advice to farmers. Learning can be formal through attending subject-matter conferences, workshops, and symposia, enrolling at institutions of higher learning for further study and/or by targeted professional development activities. Conducting research is an effective way to keep at the forefront of one's discipline. The Extension Service should consider incorporating research, albeit minimal in the job description of AEPs to help them keep current.

3.2.2 Accountability

The climate-smart AEP is accountable to the farmers s/he serves by providing data-based advice. The AEP is also accountable to the employer by keeping accurate records of his/her daily work activities and in taking responsibility when something goes wrong. Registration in Professional Bodies is useful to keep up to date and to resolve issues of professional conduct. Last, but of equal import, the AEP is accountable to him/herself for continuous learning.

3.2.3 Active listener, with good communication and conflict resolution skills

The AEP must have deep insights into the scientific subject matter than the farmers (communal, small scale and commercial) he advises. If farmers establish that they are more knowledgeable than the AEP on his/her subject matter, it becomes for them to keep interest in the AEPs advice. One cannot emphasize enough the importance of keeping at the cutting edge of one's profession. The AEP must be an active listener so that s/he understands the farmer's challenges and addresses them specifically and not give general textbook advice. Climate change is local. Two adjacent farms may experience dialectically opposite challenges in the same season, and therefore there is the need for farm-specific mitigation strategies. Good listening helps the AEP learn from the farmer. This is useful in arriving at effective farm-specific mitigation strategies. Good listening is integral to effective communication and helps to resolve conflict.

3.2.4 Collaborator with good interpersonal and time management skills

Even if the AEP keeps at the coalface of his/her discipline, there are times when challenges require collaboration with other AEPs, agricultural researchers, discipline specialists, and/or academia. The multidisciplinary nature of CC challenges requires agricultural stakeholders from the AEP, Government and University Researchers to provide holistic services to farmers in their district, province and nation. In the reference countries, the integration of agricultural services providers is without exception seamless. This is implicated in the European Union's description of the agriculture continuum as "Agriculture Knowledge and Information System, [AKIS]",

(Madsen-Osterbye, 2014). The climate-smart AEP is a collaborator with good interpersonal skills. Such an AEP knows when and where to get assistance from, and if in doubt s/he is able to tell the farmer that *"let me seek more information and/or involve others in this and come back to you".* Knowing when and where to seek assistance from is excellent respectful professional judgement and is good time management. There is no need to waste time on issues that one cannot resolve and/or singularly address.

3.2.5 Attends to detail, but sees the big picture

Climate change requires the AEP to attend to specific details when addressing the farmer's problems and yet, s/he should not lose sight of the big picture. The mitigation advice given by the AEP must address the farmer's specific challenges whilst working within the broader context to *"making agriculture more economically viable, environmentally responsible, socially acceptable and sustainable."*

3.2.6 Creative and critical thinker

When one works with biological systems, one has to be creative and think critically. Biological systems such as agriculture are not always symmetrical, and common challenges may require different responses. Agriculture involves animal, biological, crop, chemical, environmental, engineering, socio-economic, physiological, physical, meteorological, and other sciences and is dynamic. This requires the AEP to be creative and to think critically. Climate change further complicates the already complex situation.

3.2.7 Experiments and learns together with farmers

Climate change brings uncertainty to conventional farming data and norms. The climate-smart and commercial aware AEP experiments and learns with farmers on best production and mitigation options. To achieve this, the AEP must collect and analyse data on variables that affect agriculture in his/her area. Collecting, keeping and analysing data enables the AEP to provide area specific solutions to farming challenges. The AEPs in adjacent municipalities and districts can collaborate; form Working Groups in data collection and analysis in order to obtain specific and big picture trends in the area. The climate-smart and commercial aware AEP provides local data-driven mitigation strategies that benefit farmers.

3.2.8 Utilizes technology effectively

Used strategically, technology is helpful in any industry and agriculture is no exception. The climate-smart AEP uses technology to access his/her farming clientele 24/7 among others. This however, should not substitute the occasional farm visit for one-on-one advisory meetings. For example, the AEP can keep all records of his/her daily work and on farm visits electronically, instead of carrying files. As needed the AEP, can print this for submission to the supervisor and generates a paper trial. With today's advanced ubiquitous technology, this should be a requirement for service, and it fosters accountability.

4. CONCLUSION AND RECOMMENDATIONS

Agriculture provides the basic human needs of food and shelter. Without meeting these basic physiological needs, all other efforts in human endeavour are futile. It is no coincidence that developed countries provide unequivocal support for their Nations' agriculture. The Extension Service is a crucial cog in any successful agricultural system. To address CC, the AEP is an Agent of Change that mobilizes farmers to adapt and assists them succeed. In order to succeed in this role the AEP must be empowered to be climate-smart and commercial aware by relevant education and skills upgrade through professional development.

The climate-smart AEP understands the scientific basis of anthropogenic global warming and CC. S/he has sound knowledge of the science behind production agriculture in one's area of specialization and keeps at the forefront of new developments by reading extensively, participating in professional conferences, workshops, webinars, and registering in discipline-specific bodies. Technology is generating knowledge at increasing speed. This requires the climate-smart AEP to be willing to continuously learn and improve his/her skills, in order to remain current, and be an effective Change Agent.

Agriculture is a science and a business. The industry faces multidisciplinary complex challenges, including CC. Therefore, the climate-smart, commercial astute AEP collaborates and works well with others within and across disciplines to find solutions to common problems. In addition to a strong science background, the AEP has solid understanding of the business that agriculture is. The bottom line for any farmer (communal, small scale or commercial) is the same: *"how does my farming enterprise (aquaculture, crops, livestock, and wildlife) maximize profit in a sustainable manner that does not compromise the environment and societal wellbeing."* In other words, the climate-smart, commercial astute AEP provides solutions to farmers and in the process makes agriculture economically viable, environmentally sound, socially responsible and sustainable. To enable him/her mitigate CC, the National and Provincial Departments of Agriculture should empower the AEP by among others:

- Providing country, provincial and municipality CC mitigation strategies, and setting up infrastructure to enable the monitoring of weather at municipality, and provincial levels;
- Providing constant professional development and skills upgrade opportunities for all AEPs and designing instruments to monitor progress and make sure that they remain at the cutting-edge of what they do;
- Collaborating among government departments, institutions of higher learning, business, and non-governmental organizations in order to address CC challenges holistically;
- Working with universities to fine-tune curricula and strengthen scientific training in agriculture. In developed countries, graduates who later work as scientists or as AEPs study and obtain the same qualifications at BSc degree level. In other words, those who opt for Extension have the same basic scientific background as those that pursue science and research; and
- Encouraging and rewarding sustainable agricultural practices that curb the release of soil carbon into the atmosphere such as conservation agriculture and/or minimum tillage and land rehabilitation that captures and stores carbon;

In addition, the climate-smart commercial aware AEP should:

- Have strong work ethic and solid practical competence in order for farmers to derive value and benefit from her/his services:
- Collaborate and work closely with government and university scientists to address the complex CC challenges in one's area of service holistically;
- Willing to experiment and learn with farmers and scientists while they together develop and implement appropriate mitigation strategies for the locality;
- Address specific local challenges by among others, collecting and analysing weather and production data in their area and willing to continue learning from own and others' experiences; as well as
- Have sufficient production agriculture insights in order to be able to provide useful information to farmers on biological, economic, and environmental implications of their decisions.

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Corresponding author conceived the idea, analysed literature and wrote the paper. Co-authors helped discuss issues in this paper. Views expressed are solely those of the authors based on their academic and professional insights and may not necessarily reflect those of the employer. Karen Puchert is thanked for art in diagrams Figures 3 and 4.

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Back to Table of Contents

THE ROLE PLAYED BY DRDAR PARASTATALS TOWARDS COMMERCIALIZATION OF FARMERS (NATIONAL WOOL GROWERS, CASE STUDY MBINJA, LUJECWENI AND MNCETYANA).

Ngcuka, B.[22]

1. INTRODUCTION

Modernization and commercialization of the smallholder agricultural sector provides the stimulus and impetus to reducing food insecurity in developing countries. This has been a subject of considerable focus among policy – makers and development specialists not only at the level of farming households but also at the level of national and international policies (Omamo,1998).

The agricultural sector plays a critical in the South African economy especially to millions of contributes to about 24 percent of the Gross Domestic Product (GDP) and support up to 70 percent of population that engage directly in it (FAO,2004). Smallholder agriculture remains the major engine of rural growth and livelihood improvement in South Africa (Hazell, 2005). Meeting the challenges of eliminating food insecurity and improving rural incomes in South Africa will require transformation and transition out of the semi-subsistence, low – input, low-productivity farming systems that currently characterize much of rural South Africa (Govereh etal.,1999). Some studies show that population growth can increase the quantity of marketable surplus (Barret, 2008) while other studies find that rural infrastructure affected agricultural commercialization through its impact on prices, diffusion of technology, and efficient combination of inputs and outputs (Barret,2008). Further studies highlight that the development of infrastructure increases the extent of use of modern technology, such as irrigation, improved varieties and fertilizer (Okello et al.2012). The work of Strasberg et al (1999) found that price and distances to a paved road (an indication of travel costs) significantly reduced use among farmers. Sheep farming in communal areas play an important role for mutton production and wool production because wool fibre is an earner of foreign currency. Therefore, it is crucial for any communal farmer to allow his or her animals to perform well for healthy growth and wool development (Giepie, 2016: 24). Management is the most important aspect affecting the success of wool production.

2. BACKGROUND

The farmers were shearing their wool and sell it to the local or informal market. They didn't feed their livestock in winter, they rely maize stock after harvesting. They didn't use supplements like max block which reach in bypass – protein. They didn't follow dosing and as well as vaccination program.

3. OBJECTIVE OF THE STUDY

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The aim of the project was to evaluate the effectiveness of parastatals in helping rural farmers towards commercialization of farming.

4. MATERIALS AND METHODS.

4.1 Site description.

The case study is done in Mncetyana, Lujecweni and Mbinja administrative areas. These areas form the West part of Tsolo sub – district. Rainfall is 50 – 300 mm per annum. The veld type in these areas is sour veld.

4.2 Methodology

Survey: Social facilitation and mobilization were to group the farmers according to their interest groups. This was also done to form and establish the national wool growers' associations so as to organize farmers and train them according to their needs in wool production.

Meetings, information days, awareness programs, and flock competitions were conducted in these three areas to bring awareness to the farmers concerning the governmental programs and wool production commodity.

4.3 Extension approaches.

Commodity approach – This approach was used to group farmers on their interests so as to transfer the necessary skills and new developed technologies to the relevant group of farmers.

Integration approach – This approach was used with the aim of identifying the relevant stakeholders that were going to help rural farmers towards commercialization of farming. NWGA the key stakeholder and parastatal of DRDAR played a very important role in training of farmers pertaining quality wool production, sheep shearing, wool sorting and classing. Ram exchange was done to improve DNA to the flock of the farmers. Mhlontlo Local municipality donated sets of shearing equipment to ten associations in Tsolo.

Participatory approach – This approach was used as a linkage between the relevant groups of farmers with the identified strategic partner which gives an opportunity to the farmers to participate fully in the program to gain more experience. In this case the farmers were participating with natural resources like grazing land, rivers and as well as their livestock. During shearing season, the farmers are shearing their sheep. That is way showing their maximum participation in the program and in their commercialization.

5. RESULTS AND DISCUSSIONS

As a result of the intervention of NWGA as parastatal of DRDAR 37 wool grower's associations were established. This parastatal played a very significant role in mobilization of farmers for dosing and vaccination program. The farmers are doing shearing, classing and classing of wool together.

The training of farmers in the above farming practises were done together. Programs like animal nutrition was done by the help of national NWGA. The mind set in farmers changed from producing for local market, to produce for the formal market. Farmers selling their wool to BKB and CMW. They produce the quality wool as a result of training for sorting and classing of wool by NWGA. The profit in the selling of wool increase as result of these trainings. The small stock management is intensified. There is shift from subsistence to commercial level of farming.

6. CHALLENGES

Stock theft
Drought
Budget
Infrastructure development like Shearing sheds and dipping tanks.

7. RECOMMENDATIONS

The DRDAR have to intensify corroboration between her and SACP department.
The department should increase the budget for Livestock programs for construction of more shearing sheds and dipping tanks.

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Back to Table of Contents

CURRENT APPROACH TO AGRICULTURAL DEVELOPMENT IN THE EASTERN CAPE: FROM GOVERNMENT ASSISTED TO COMMERCIAL AGRICULTURE.

Poswal, M. A. T.

THIS PAPER WAS NOT AVAILABLE AT THE TIME THE PROCEEDINGS WAS PRODUCED.

Back to Table of Contents

FOURTH SESSION.
READINESS OF THE SWAZILAND SUGAR INDUSTRY TOWARDS THE USE OF ICT SPECIFICALLY CELL PHONES TO ACCESS INFORMATION: PERCEPTIONS OF SMALLHOLDER SUGARCANE FARMERS AND EXTENSION OFFICERS.

Dlamini, M. M.[23] & Worth, S. H.[24]

ABSTRACT

The study investigates smallholder sugarcane farmers and extension officer's perceptions of readiness towards the use of ICT especially cell phones as a technology for accessing information within the Swaziland sugar industry. The study was a census involving all active smallholder sugarcane farmers (N=172) in Swaziland and their extension officers (N=17). Quantitative data were collected through face-to-face interviews using a valid and reliable structured questionnaire. Descriptive statistics and one-way analysis of variance (ANOVA) were applied to analyse the data using SPSS version 20 statistical software. The results revealed that sugarcane farmers and extension officers perceive the Swaziland sugar industry to be ready for the introduction and subsequent use of ICTs to access sugarcane production information. The sugar industry infrastructure and other facilities that are necessary for the use of cell phones were perceived to be ready for the implementation of the cell phone technology. All respondents were also found to possess cell phones which they personally owned. The entire sugar industry had access to cellular network and electricity. It was also shown that some demographic variables of respondents did have an influence on their perceptions regarding the industry's readiness towards the use of cell phones to access information. The results of this study can provide guidance to the government and the sugar industry of Swaziland when considering implementing improved information dissemination based programs.

Keywords: cell phone, sugarcane, extension, ICT, Swaziland, farmers, readiness.

1. INTRODUCTION

In a rapidly changing world, agricultural extension has been recognised as an essential mechanism for delivering knowledge, Information and advice to a large majority of farmers (Richardson, 2003). Arkhi et al. (2008) noted that agricultural extension has an important role of connecting farmers and the research centres. The application of ICT in the field of agriculture has been reported from different parts of the globe. ICTs have an important role of assisting extension in transferring up to date information to farmers as well as reporting the needs of farmers to research centres. This process according to Arkhi et al (2008) reduces the costs of

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travelling by removing the physical distances that could have been travelled by extension personnel in trying to reach and assist rural farmers.

Agriculture is one of the most important sectors in Swaziland and sugarcane is one of the major cash crops grown in the country. The sugar industry sector is the backbone of the Swazi economy according to the National Adaptation Strategy of Swaziland. It contributes about 18 percent towards the Gross Domestic Product (GDP), 35 percent towards private sector wage employment and 11 percent to national wage employment. Sugarcane production in Swaziland takes place in the Lowveld part of the country due to its good soils and the favourable climatic conditions. The crop is grown under irrigation over a period of 11 to 12 months with annual harvests. This sector could benefit tremendously with the application of ICTs especially in bringing changes to the livelihoods of the poor in the rural areas of Swaziland.

One of the most popular ICT applications is e-learning. With e-learning, available technologies can be used to enhance learning and expand access to information and knowledge within the agricultural sector of Swaziland. The use of e-learning in the field of agricultural extension is becoming popular in many countries due to the development of ICT. Omotayo (2005) observed that frontline extension workers who become the direct link between farmers and other actors in the extension of agricultural knowledge and information systems are well positioned to make use of ICT to access expert knowledge or other types of information that could improve the farmer's ability to improve productivity.

ICT programme implementation in a developing country relies on various facets such as infrastructure, government policy, cultural factors, organisational factor and human resources. Human resources are one of crucial factors to help diffuse the ICT programme. Hence this article focuses mainly on the human resources factors to investigate the readiness of the Swaziland sugar industry towards the use of ICTs (specifically cell phones), to access sugarcane production information. Assuming that these factors can be clearly identified, the information can be used by the sugar industry to increase the use of this approach of learning to improve sugarcane productivity among smallholder sugarcane growers in Swaziland. This will in turn have a positive impact on sustainable agricultural development and the economy of the country. The results will also serve as a valuable baseline of ICT diffusion within the sugar industry of Swaziland so that the growth or decline of this approach could be tracked.

Therefore, the main purpose of this article was to investigate the readiness of the Swaziland sugar industry as perceived by smallholder sugarcane farmers and their extension officers on the use of ICTs to access sugarcane production information. The study was performed with the guidance of the following research objectives:

1. Describe respondents by demographic variables.
2. Determine the perceived readiness level of the Swaziland sugar industry towards the use of ICT to access sugarcane production information.
3. Determine the availability and usage of ICT hardware's within the sugar industry of Swaziland.
4. Explain if demographic variables of respondents (Age, gender, education, experience, marital status and respondent's category) do affect their perception of the sugar industry's readiness towards the use of ICTs to access sugarcane production information.

2. LITERATURE REVIEW

The use of Information and Communication Technology (ICT) is becoming more widespread in different sectors including agriculture. One of the most popular ICT applications is e-learning whereby available technologies are used to enhance learning and facilitate information access in the agricultural sector. The readiness of farmers and extension workers to use ICT in any community is an issue that needs to be addressed before that technology is introduced (Kauffman & Kumar, 2005). The assessment of ICT readiness allows for proper planning for its integration so that efforts are focused in areas where further attention is required (Krull, 2003).

Readiness is defined by So & Swatman (2006) as being mentally or physically prepared for some activity or action. Trinidad (2002) emphasised that it is very crucial to conduct an initial assessment of preparedness for e-learning among farmers and extension workers before a new technology is introduced. Trinidad (2002) further explains that this assessment should consists of several technological factors such as computer, internet and telephone line readiness. Other factors to consider are educational and they include network learning, network society, network economy, network policy, English proficiency and computer literacy. Watkins (2003) proposed that the assessment for e-learning readiness should include technology access, technology skills, online reading and internet chat.

Some studies have indicated that demographic and background characteristics such as age, gender, ethnicity, marital status, level of education, experience with computers and internet have an influence on ICT adoption thus they need to be assessed too (Dundell & Thompson, 1997; Whitley, 1997; Teo & Lim, 2000; Muilenberge & Berge, 2005; Ong & Lay, 2006)

According to Darab & Montazer, (2011), infrastructure readiness assessment focuses on evaluating whether the existing infrastructure could sustain the new intervention and if not, such infrastructure must be provided. Human Resource readiness on the other hand focuses on evaluating the incumbents in terms of motivations, attitudes resistance and skills required in providing e-learning. Machado (2007) recommended that prior to the implementation of e-learning services it is important to understand the administrator's vision, their abilities in implementing policies and strategies that support e-learning and further highlights that policies and strategies help in capacitating other stakeholders in terms of motivation and training.

3. METHODOLOGY

The study was conducted in the year 2015 within the Lowveld region of Swaziland where sugarcane is mainly grown. The survey method using the interview technique was used in the study. This study also carried quantitative research to investigate the perceptions of sugarcane farmers and extension officer's readiness towards the use of ICT to access sugarcane production information. Four enumerators who had recently graduated from the University of Swaziland were engaged and trained on how to collect the data. The study was a census and a structured questionnaire was used to interview all the smallholder sugarcane farmers (N=172) as well as all the sugarcane extension officers (N=17) who were actively growing sugarcane in Swaziland during the year of data collection.

A total of 201 questionnaires were issued to respondents and only 189 (172 famers and 17 extension Officers) were valid giving an effective response rate of 94%. Data was collected with a pre-tested schedule. Descriptive statistics and one-way analysis of variance (ANOVA) were applied to analyse the data using SPSS 20. The study aimed at determining any significant difference in the readiness perceptions of respondents due to background and demographic variables. A series of one-way analysis of variance (ANOVA) were performed to observe if the overall responses of the participants differ according to age, gender, education level, experience, marital status and respondent's category. For testing significant differences, the alpha level was set at 95% ($P < .05$). Frame, selection and non-response errors were controlled in accordance with suggestions by Miller and Smith (1983). An up to date list of all the active sugarcane growers was obtained from the Swaziland Sugar Association (SSA) extension services, thus controlling frame error. The list was then purged for duplication of names and for those growers who were no longer in the business of growing sugarcane and, to control selection error. A panel of experts consisting of two senior extension managers from SSA, one extension manager from The Food and Agricultural Organisation (Swaziland) and four academic staff members from the University of Swaziland, department of Agricultural Education and Extension were asked to review the instrument for content validity. Experts attested to the content validity of the instrument. A pilot test was conducted to determine the reliability of the questionnaire using cane growers from Vuvulane estates who did not participate in the study, Kuder Richardson (KR21) and Cronbach alpha procedures were used to calculate reliability coefficients of independent variables.

4. DATA COLLECTION INSTRUMENT

The questionnaire was divided into three parts: Part I listed items related to demographic variables and background information. Respondents were asked to circle their choices or fill information in the space provided. Part II contained items that would enable the implementation and subsequent use of ICT to access information within the sugar industry of Swaziland. Respondents were asked to fill the information in the space provided or circle their choices against each item. Part III consisted of items pertaining to the readiness of respondents towards the use of ICT to access sugarcane production information. Respondents were asked to rate each item of readiness using a Likert type scale ranging from one (strongly disagree) to six (strongly agree). A cut off point of 3.5 was established such that all those responses with a mean value of less than or equal to 3.5 were categorised as having disagreed and all those above 3.5 were recorded as agreed.

5. THEORETICAL FRAMEWORK FOR THE STUDY

Extension exists to make agricultural information accessible to farmers and other stakeholders who need it to improve productivity (Salau, Saingbe, & Garba, 2013). Unfortunately, extension currently does not meet this goal. The public extension service, especially in the Sub-Saharan Africa region, has not been effective enough in conveying agricultural information to farmers. Farmers sometimes resist a much-needed improved technique not because they do not want it but because they are ignorant of the practice (Salau et al., 2013).

Masuki et al. (2010) argues that agricultural information plays an important role in the development of smallholder farmers towards increased production. He noted that most smallholder farmers are located in the rural areas, therefore an increase in their production automatically leads to a more desirable lifestyles for the rural people, food security and national economies of the countries where they operate. When reliable and accurate information is availed on time to smallholder farmers, they can reduce their production costs, improve their productivity, have collective bargaining with buyers and input suppliers, thus maximising their profit margins (Ikoja-Odongo & Ocholla, 2004; Masuki et al., 2010; Richardson, 1997).

A conceptual framework was developed to demonstrate the differences between smallholder farmers and large-scale famers with regard to accessing information via ICT – highlighting the influence of barriers, information management and readiness for ICT introduction.

In this context of farmers, extension and ICTs, readiness addresses four elements: the readiness of farmers to adopt/use ICTs to access information; the readiness of extension officers to adopt/use ICTs to access and disseminate information; provision of ICT infrastructure; and the ability to manage the communications infrastructure.

As shown in Figure 1, the readiness of smallholder rural farmers towards the use of ICT to access information is very low. This has a potential to create poor uptake and usage of ICT for information access, thus leaving smallholder farmers vulnerable to poor decision-making about the production and other operations of their farming enterprises which then leads to lower than possible yields. Conversely, Figure 1 also shows how prepared larger-scale farmers are for the introduction of ICT to access crucial information for improving their productivity.

This framework allows for separating out the causes of readiness or lack thereof to use ICTs in relation to information access and dissemination. This will facilitate policy and practical decisions in relation to making sure that any issues related to farmers and/or extension officers not being ready to use ICTs are accurately targeted. Similarly, issues related to the provision and management of ICT infrastructure can be clearly identified (and separated from other issues) and addressed accordingly.

6. RESULTS AND DISCUSSIONS

The data discussed in this paper were analysed using the framework in Figure 1. Respondents were asked to rate how they perceive each of the readiness domains (farmers, extension officers, infrastructure and management) to be ready for the introduction of ICT to enhance information access.

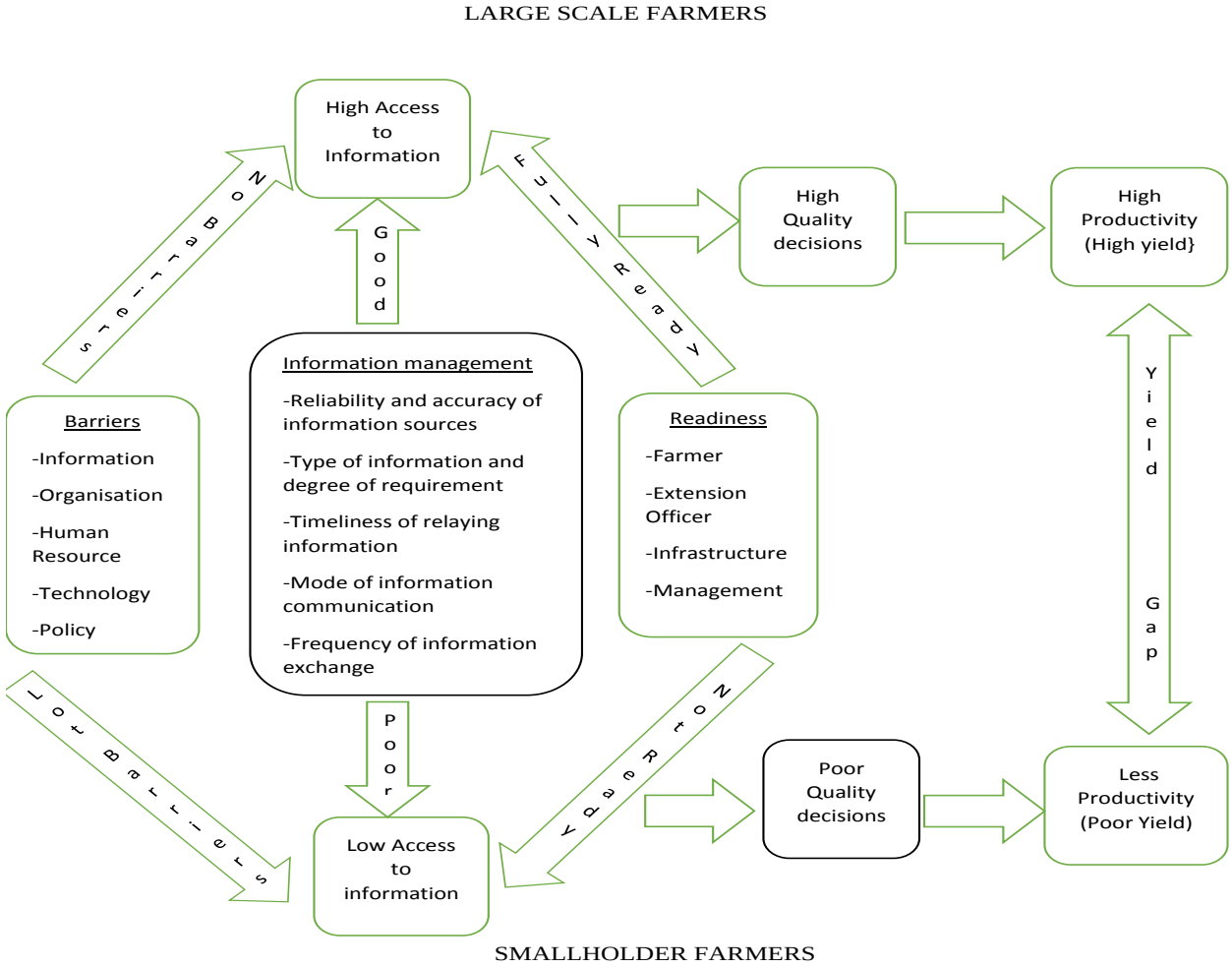

Figure 1: Diagrammatic representation of how information access influences the productivity gap between smallholder and large-scale farmers.

The reporting of results and discussions have been organised into four sections. The first section describes demographic variables of respondents. The second section reports the perceived readiness level of respondents towards the use of ICT in accessing sugarcane production information. The items were arranged into four domains of farmer readiness, extension officer readiness, infrastructure readiness and extension management readiness. The third section reports the availability and usage of ICT hardware's within the sugar industry of Swaziland while the fourth section describes if demographic variables of respondents did affect their perception of the industry's readiness towards the use of ICTs in accessing sugarcane production information?

6.1 Respondents Demographic Variables

Respondents were described according to their demographic variables including age, gender, education level, sugarcane production experience and marital status. Results are presented in Table 1, and they reflect that the majority of the respondents are in the age group of 30 – 39 years (38.6%) followed by 40 - 49 years (19%) group for both farmers and extension officers.

With respect to gender, both farmers and extension officers had higher proportions of male respondents (74.6%).

Table 1: Respondents' demographic profile

		Farmer (N=172)		EOs (N=17)		Total (N=189)	
Characteristic	Category	F	%	F	%	F	%
Age	19 – 29	24	13.9	3	17.6	27	14.3
	30 – 39	64	37.2	9	53.0	73	38.6
	40 – 49	32	18.6	4	23.5	36	19.0
	50- 59	25	14.5	1	5.9	26	13.8
	> 60	27	15.8	0	0	27	14.3
Gender	Males	124	72.1	17	100	141	74.6
	Females	48	27.9	0	0	48	25.4
Education	None	8	4.7	0	0	8	4.2
	Primary	30	17.4	0	0	30	15.9
	Secondary	38	22.1	0	0	38	20.1
	High school	56	32.6	0	0	56	29.6
	Tertiary	40	23.3	17	100	57	30.2
Experience	1 – 5	69	40.1	4	23.5	73	38.6
	6 – 10	28	16.3	7	41.2	35	18.5
	11 – 15	40	23.3	3	17.6	43	22.8
	16 – 20	14	8.1	2	11.8	16	8.5
	21 <	21	12.2	1	5.9	22	11.6
Marital Status	Married	151	87.8	13	76.5	164	86.8
	Single	21	12.2	4	23.5	25	13.2

From the results, it is evident that the sugar industry of Swaziland is still male dominated when it comes to leadership of the small holder farmer groups. Worth noting again is that all (100%) the sugarcane extension officers were male. This observation opens the need to encourage women to tap into this industry. The educational status of the farmer respondents shows that the majority (30%) had gone up to tertiary education followed by those (29.6%) who went as far as high school and the rest never finished secondary school.

Regarding the extension officers, all had gone through tertiary education and this is mainly due to the minimum requirement set by SSA for one to be employed as an extension officer. With regards to the number of years of service, both farmers and extension officers had the majority of respondents (38.6%) with 1 – 5 years of service in the sugar industry. These were followed by those respondents (22.8%) who had 11 – 15 years of experience. Very few were above 21 years of experience. The marital status of respondents indicates that the majority (86.8%) were married and the rest were single. So, it could be concluded from the results of the demographic variables that most of the study respondents were middle aged, married males, educated with 1 – 5 years sugarcane production experience. An educated individual in the Swazi context refers to someone who has completed high school education and a middle-aged person is one falling between 30 to 39 years of age.

6.2 Readiness level of the sugar industry

Research objective two sought to determine the perceived readiness level of the Swaziland sugar industry towards the use of ICT in accessing sugarcane production information. The results are presented in Table 2 below.

6.2.1 Farmer readiness

The results indicate an overall mean score of M=4.37 (SD =.95) on famer's readiness towards the use of ICT for information access within the sugar industry. This mean score implies that farmers are perceived by the majority of respondents to be ready for the use of ICT specifically cell phones as a technology for disseminating information within the sugar industry of Swaziland. This is also supported by the fact that the majority of the sugarcane farmers possessed cell phones which they personally owned and were already using these gadgets to disseminate work related information within and outside their work stations. It was also highlighted that most of these farmers were using their own airtime to communicate work related issues during and after working hours.

6.2.2 Extension officer readiness

Overall perception of extension officer Readiness towards the use of ICT has a mean score of M=5.12 (SD = .84) as indicated in Table 2. This mean score indicates that all respondents perceive extension officers to be ready for the implementation of cell phones as a technology for disseminating information within the sugarcane industry stake holders. All extension officers interviewed possessed personal smart phones and all had gone through tertiary education which makes them ready for the introduction of such a technology. All respondents agreed that extension officers, with their high ICT competency can improve their teaching and learning by integrating such technology in their extension programs. Respondents also agreed that this is the right time for promoting the dissemination of information within the sugar industry of Swaziland.

Table 2: Perception of readiness towards the use of ICT to access sugarcane production information

Items	Farmers (N=172)		EOs (N=17)		Total (N=189)		
Farmer Readiness	M	SD	M	SD	M	SD	CA
Farmers know that ICT's can be used	4.60	1.20	4.53	.94	4.59	1.18	
Farmers are capable of using ICT's	4.66	1.04	4.06	.97	4.61	1.04	
Farmers have the skill to use ICT's	4.18	1.29	3.18	1.24	4.09	1.32	
Farmers are ready to use ICT's	4.48	1.24	3.76	1.20	4.41	1.26	
Internet access is not a farmers problem	4.18	1.44	3.53	1.74	4.12	1.48	
Overall	4.42	.94	3.81	.89	4.37	.95	.81
Extension Officer Readiness							
E0's know how to use ICT's	4.99	.79	5.47	.51	5.04	.79	
ICT's can improve extension	5.10	.56	5.35	.49	5.13	.56	
Now is the time to promote ICT usage	5.18	.48	5.41	.51	5.20	.49	
E0's are ready to integrate ICT in their extension programs	5.10	.63	5.18	.73	5.11	.64	
E0's have enough ICT competency	5.13	.47	5.06	1.09	5.13	.55	
Overall	5.10	.47	5.29	.45	5.12	.47	.82
Infrastructure Readiness							
Infrastructure supports ICT implementation	5.02	.78	4.41	.87	4.96	.81	
Adequate ICT support from industry	5.10	.64	4.71	1.21	5.07	.72	
Industry has enough budget to support ICT usage	5.14	.52	4.94	.97	5.12	.58	
Overall	5.09	.50	4.69	.76	5.05	.54	.75
Management Readiness							
Extension management knows ICT	5.25	.58	5.53	.72	5.28	.60	
Extension management supports ICT	5.19	.65	5.06	.75	5.17	.66	
Management has a plan for ICT implementation	5.25	.58	5.53	.72	5.28	.60	
Overall	5.22	.59	5.29	.69	5.22	.60	.90

6.2.3 Infrastructure readiness

Results shown in Table 2 indicates a mean score of M=5.05 (SD = .54) on infrastructure readiness for the use of ICT within the sugar industry. This is an indication that most respondents agreed that the infrastructure in the sugar industry of Swaziland is perceived to be ready for the use of cell phones as a technology for information dissemination. Respondents reported that they all have access to the cell phone network in their respective areas where sugarcane is grown. Network coverage is very crucial for cell phone connectivity. Electricity which supplies energy to the satellites and recharge cell phones was reported to be accessible by all the respondents in their respective areas of sugarcane production. The availability of cell phone service centres within the vicinity of each mill makes it easy for the respondents to get immediate help when

their cell phones have a problem. Airtime is also readily available in almost all the small grocery shops situated within the farmer's residential areas.

6.2.4 Management readiness

Management is perceived by most respondents to be ready for the use of ICT to circulate information within the sugar industry of Swaziland. This is indicated by the overall mean score of M=5.22 (0.60) in Table 2. Respondents agreed that extension management know how to use ICTs specifically cell phones and the use of such technology was supported. They went on to confirm that a plan for the implementation of ICT usage was on the pipeline.

6.3 Hardware availability and usage

Any organisation that aims at adopting the use of ICT to access information must have at least the minimum hardware requirements and soft wares to use that hardware. ICT hardware's include the physical equipment that will enable the sugar industry stakeholders to communicate effectively. Without appropriate equipment and easy access, it is quite hard to access information via ICTs (Oliver & Towers, 2000). Broadbent (2001) however stated that this does not require a huge infrastructure. A well working internet connectivity and enough supply of communication gadgets would be enough for an effective communication system.

Objective three of the study therefore enquired from both farmers and extension officers about the hardware availability and usage within the sugar industry, in particular, the focus was on the cell phone technology, the internet and other factors associated with mobile cellular usage. The results are presented in Table 3. These factors included cell phone possession, cell phone ownership, cell phone brand, social media, transport, mobile network coverage, electricity availability, distance from the mill and type of cell phone used.

6.3.1 Cell phone possession and ownership

Table 3 indicates that all farmers and extension officers (100%) in the sugar industry possessed cell phones and these cell phone gadgets are used in disseminating work related information among the Swaziland sugar industry stakeholders on a daily basis. With regards to ownership of these gadgets, the study revealed that a majority of the respondents (98.6%) personally owned the cell phones, while only 3.2% reported that they were using company owned gadgets. All the respondents reported that they use their own airtime to disseminate work related information using their cell phones. This is an indication that smallholder sugarcane farmers and their extension officers have realized the importance of using the cell phone technology in the dissemination of information timely and accurately among themselves and other sugarcane stakeholders.

Table 3: Network and cell phone accessories

		Farmer (N=172		EOs (N=17)		Total (N=189)	
Variable	Category	F	%	F	%	F	%
Possession	Yes	172	100	17	100	189	100
	No	0	0	0	0	0	0
Ownership	Personal	166	96.5	17	100	183	96.8
	Company	6	3.5	0	0	6	3.2
Brand	Nokia	125	72.5	9	52.9	134	70.9
	Samsung	21	12.3	5	29.4	26	13.8
	Huawei	8	4.7	1	5.9	9	4.8
	ZTE	6	3.5	0	0	6	3.2
	Other	12	7	2	11.8	14	7.4
Type	Regular phone	108	62.8	4	23.5	112	59.3
	Smartphone	64	37.2	13	76.5	77	40.7
Social media	Yes	99	57.6	14	82.4	113	59.7
	No	73	42.4	3	17.6	76	40.2
Network	Available	172	100	17	100	189	100
	Not available	0	0	0	0	0	0
Electricity	Available	172	100	17	100	189	100
	Not available	0	0	0	0	0	0
Transport	Foot	111	64.5	0	0	111	58.7
	Bicycle	15	8.7	0	0	15	7.9
	Motorbike	6	3.5	0	0	6	3.2
	Vehicle	40	23.3	17	100	57	30.2
Mill distance	6 – 19	12	7	1	5.9	13	6.9
	20 – 39	137	79.6	11	64.7	148	78.3
	40 – 59	11	6.4	4	23.5	15	7.9
	60 <	12	7	1	5.9	13	6.9

6.3.2 Cell phone type and brand

The majority of the respondents reported that they were using the Nokia brand (70.9%) of cell phones followed by the Samsung brand (13.8%) as shown in Table 3. This could be attributed to the fact that these brands are readily available in the market, affordable and easy to fix. With regards to the type of cell phone being used by the respondents, most reported that they were using the regular type (59.3%) of phone mainly because they were cheaper and less complicated to use. Only 40.7% of the respondents reported that they were using smartphones. Regular phones are cheaper and easy to operate where as smart phones are expensive and require a certain level of skill to operate them.

6.3.3 Network and electricity

As Table 3 illustrates, all smallholder sugarcane farmers and their extension officers reported that they have access to cellular network almost everywhere within the sugar industry of Swaziland. The only difference reported was the strength of the cellular network as some places had weaker connections than others. Topography and satellite distribution do influence the network strength of a given area. Regarding electricity, all respondents reported that they had access to electricity in their homes and that is where they recharge their cell phones. This is mainly due to the Rural Electrification project driven by the government of Swaziland which has seen a number of rural areas being provided with affordable electricity. The availability of electricity and mobile cellular network within the sugar industry of Swaziland has made the sugar industry to be ready for the implementation of most ICT programmes especially the use of cellular phones.

6.3.4 Transport and Distance from the mill

The study revealed that most respondents (58.7%) travel by foot while carrying out their day to day sugarcane production activities. Only 41.3% are using cars, motorbikes and bicycles. The use of cell phone to disseminate information helps in reducing the distance travelled by the farmers and their extension officers whenever they want to share information. The study also revealed that most respondents were within a radius of 20 to 39 km (78.3%) from the mill. Most input suppliers and service providers in the sugar industry are located next to the sugar mills. The use of cell phones helps both farmers and extension officers to acquire information accurately and timely from such institutions thus reducing the travelling costs. Such an arrangement also increases the time spent on supervising different daily activities in the farm thereby improving productivity.

6.3.5 Social media

Grouping farmers in order to be able to share information to them as a group while they physically remain in their respective workstations is very important. This can best be achieved by the use of social media accessible via cell phones. The study revealed as shown in Table 3 that more than half of the respondents (59.7%) are not yet connected to any social media. Only 40.3% are connected and this presents a need to educate and encourage the respondents to use social media for accessing new information on sugarcane production.

6.4 Influence of Demographic variables of respondents on their responses.

The fourth research objective of the study aimed at determining any significant difference in the readiness perceptions of respondents due to background and demographic variables. A series of one-way analysis of variance (ANOVA) were performed to observe if the overall responses of the participants differ according to age, gender, education level, experience, marital status and respondent's category. The results are presented in Table 4.

6.4.1 Age

The results in Table 4 indicates that age had an influence on respondent's perceptions towards farmer readiness [F (4, 184) = 2.83, P = .027]. The study demonstrated that the age range 60 <

years old is more positive in the perception of farmer readiness and this finding is in line with different studies which have examined the effect of age differences on technology adoption (Burton-Jones & Hubona, 2003; Venkatesh et al., 2003; Rezai et al., 2008).

6.4.2 Gender

The study revealed that gender had an influence on respondent's perception towards infrastructure readiness [F (1, 187) = 4.14, P =.043]. Many authors (Teo & Lim, 2000; Young, 2000; Muilenburg & Berge, 2005, Joiner et al., 2005; Ong & Lay, 2006) have reported significant differences between genders in the adoption behaviour of ICTs, however, the unbalanced proportion of males to females (74% males and 26% females) could also not be ruled out as a cause for this difference.

Table 4: One-way ANOVA of readiness

Variable	Category	N	Farmer readiness			Extension Officer readiness			Infrastructure readiness			Management readiness		
			Mean	F-value	Sig	Mean	F-value	Sig	Mean	F-value	Sig	Mean	F-value	Sig
Age	19 - 29	27	4.24	2.83	.026*	5.06	.832	.507	4.96	1.46	.214	5.22	.285	.887
	30 - 39	73	4.20			5.18			5.00			5.25		
	40 - 49	36	4.61			5.02			5.22			5.19		
	50- 59	26	4.18			5.15			5.19			5.13		
	60 <	27	4.78			5.13			5.05			5.30		
Gender	Males	141	4.36	.002	.961	5.13	.047	.829	5.09	4.14	.043*	5.27	.376	.540
	Females	48	4.37			5.12			5.19			5.21		
Education	None	8	4.25	2.10	.083	5.08	1.78	.143	5.13	1.43	.227	5.38	1.40	.239
	Primary	30	4.39			4.94			5.07			5.07		
	Secondary	38	4.72			5.21			5.19			5.34		
	High school	56	4.34			5.10			5.06			5.29		
	Tertiary	57	4.16			5.18			4.93			5.15		
Experience	1 – 5	73	4.33	3.69	.006*	5.13	1.49	.207	5.10	1.89	.114	5.25	3.08	.017*
	6 – 10	35	4.42			5.19			5.05			5.43		
	11 – 15	43	4.41			5.08			4.98			5.10		
	16 – 20	16	3.65			4.90			4.79			4.88		
	21 <	22	4.80			5.23			5.23			5.32		
Marital	Married	164	4.38	.497	.482	5.14	1.44	.231	5.10	10.4	.001*	5.26	4.11	.044*
	Single	25	4.24			5.02			4.73			5.00		
Category of respondents	Farmer	172	4.42	6.51	.012*	5.10	2.58	.110	5.09	8.82	.003*	5.22	.248	.619
	EO	17	3.81			5.29			4.69			5.29		

*P < .05

6.4.3 Experience

Sugarcane production experience was found to have influence on the perceptions of respondents towards two variables of readiness and these were farmer readiness [F (4, 184) = 3.69, P =.006] and management readiness [F (4, 184=3.08, P = .017]. A strong positive perception of readiness among respondents with more experience was observed for both farmer readiness variable and management readiness variable.

6.4.4 Category of respondents

Table 4 indicates that this independent variable had an influence on respondent's perceptions towards two variables which are farmer readiness [F (1, 187) = 6.51, P =.012] and infrastructure readiness [F (1, 187) = 8.82, P=.003]. Farmers viewed themselves more positive in terms of readiness whereas extension officers were less positive. With regards to infrastructure readiness, extension officers were more positive on its readiness. These differences could be attributed to the unbalanced proportion of extension officers to farmers (91% farmers and 9% extension officers)

Education level was the only independent variable which did not have any influence on the perceptions of respondents towards the sugar industry's readiness. This therefore implies that there is a need to consider those variables which have an influence towards respondent's perception when considering implementing the use of ICT to access sugarcane production information in Swaziland. Extension officer readiness was the only dependent variable that was not influenced by any of the independent variables.

7. CONCLUSION AND RECOMMENDATIONS

Cell phones have a huge potential to revolutionise the way information knowledge and new technology is managed, developed and delivered to farmers. Small holder sugarcane farmers need assistance from intermediaries to adopt knowledge and information. In that regard, extension officers are suggested to be the effective intermediaries for delivering information and knowledge to sugarcane famers. Therefore, assessment of readiness of both farmers and extension officers towards the use of cell phones as communication technology is very crucial.

The findings of the research have shown that all four factors of readiness have been perceived as ready for the implementation of cell phone technology. These readiness factors include farmer readiness, extension officer readiness, infrastructure readiness and management readiness. These findings inform the sugar industry and the government of Swaziland that they can embark on implementing cell phone technology as means of disseminating information within the sugar industry. The implementation of such a technology can cut down the costs of travelling and maximise time spent on other production issues within the farm thus improving productivity. Accurate and timely information will be disseminated within a shortest time possible thus improving the knowledge capacity of the smallholder farmer and also improving their decision-making abilities.

With regards to the basic required mobile communication facilities within the Swaziland sugar industry, the study demonstrated a high readiness level as perceived by the respondents. All farmers and extension officers possessed personally owned cell phones which they use to disseminate information during and outside working hours. They also reported to have access to both network and electricity in almost all their respective areas where they grow their sugarcane. The availability of cellular network and electricity is very crucial in the implementation of the cell phone technology for information dissemination. Most farmers are using the regular type of phone which has less functions compared to the smartphone. This may limit the farmers accessing information in the internet or in a form of videos or pictures. There is a need therefore to train these farmers to upgrade themselves to smart phones so that they get more information

via their cell phones. Most of the farmers travel by foot when conducting their daily activities and this has a negative impact when it comes to gathering or disseminating information timely. The use of cell phone technology as a communication gadget can mitigate this challenge.

Based on these findings, the sugar industry of Swaziland can effectively use the presented scenario of mobile cellular technology to improve information access among its sugarcane production stakeholders especially smallholder farmers. This could be through ensuring that every smallholder sugarcane farmer is provided with a smart phone, taught how to use it and could be provided with minimum airtime on a monthly basis. The overall cost of these could be deducted from the proceeds of their harvest as is the case with other production inputs. Another opportunity that exists is that of negotiating for a group treatment of the sugarcane farmers from the mobile service provider where benefits of special rates and the ability to send group information to farmers could be discussed.

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Back to Table of Contents

SHIFTING FROM SUBSISTENCE FARMING TO COMMERCIALISATION: CASE STUDY OF GOTYIBENI MAIZE PROJECT.

Ntinzi, M.

THIS PAPER WAS NOT AVAILABLE AT THE TIME THE PROCEEDINGS WAS PRODUCED.

Back to Table of Contents

IMPACT OF DEVELOPMENTAL PROGRAMMES ON SMALLHOLDER FARMERS OF BRONKHORSTSPRUIT REGION IN TSHWANE MUNICIPALITY, GAUTENG PROVINCE.

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ABSTRACT

Smallholder farmers in South Africa face various challenges that impede their growth and ability to contribute effectively to food security relative to commercial farmers. The farmers' developmental programmes in Gauteng are in place to minimize such constraints and reduce the risk of lack of capacity and of economic and/or financial experience among smallholder farmers. The study aimed at assessing and documenting the impact of developmental programmes on smallholder farmers focusing on City of Tshwane, Bronkhorstspruit region 7. Total of 30 projects participating in the programmes were randomly selected. Individual interviews using semi-structured questionnaires were undertaken during on-farm visits. Results shows that poverty reduction of at least 80% and increased income among farmers (70%) who were interviewed are sign that the programmes are doing well in achieving some of the objectives. The ordinal logistic regression shown that the association is statistically significant (P<0.001) for increasing income in different farming enterprises. The logistic regression model identified the job creation, market access and production capacity as the main predictors of income increase in different farming enterprises. The positive impact of government programmes on smallholder farmers in Bronkhorstspruit can be attributed to the improved net income, which in turn assists the projects to be sustainable, reducing poverty and thereby creating sustainable employment

Keywords: CASP, Ilima Letsema, Smallholder farmers

1. INTRODUCTION

Smallholder farmers in South Africa face various challenges that impede their growth and ability to contribute effectively to food security relative to commercial farmers. Some of the constraints they face relate to lack of access to land, poor physical and institutional infrastructure, high transaction costs, lack of reliable markets and lack of human capital (DAFF, 2012:1-5).

The Southern African government has in the past years implemented several policies and programmes on the agricultural sector supporting emerging farmers to reduce the risk of lack of capacity and of economic and/or financial experience among smallholder farmers. Since 1994, with the transition to democracy, agricultural policies have been developed to support

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smallholder agriculture in South Africa in the form of infrastructure grants, production inputs support, access to loans and extension services (Chaminuka *et al.*, 2008: 365-378). These intervention measures have been instituted to move out smallholder farmers out of poverty through increased agricultural production. There is evidence to suggest that this is an area in which there remains much untapped potential to create economic opportunities, especially in rural areas where poverty is concentrated (Goldman & Reynolds, 2008).

Many countries that had fairly high agricultural growth rates saw substantial reductions in rural poverty (Baffes & Gorter, 2005). However, other studies have shown that these programmes have been ineffective in stimulating rural growth and poverty alleviation and the dualistic nature of the agricultural sector continues to persist; with smallholder farmers in South Africa facing challenges of limited access to markets, inputs and credit as well as constrained property rights and relatively high transaction costs (Perret *et al.*, 2005; Ortmann & King, 2006; Hall and Aliber, 2010). Smallholder farmers are further constrained by institutional obstacles that include lack of access to information, lack of technical skills, and high marketing and transaction costs, leading to low quality and volumes (Sikwela & Mushunje, 2013). Everatt & Zulu (2004: 1-32) further reported that government initiatives to improve the quality and quantity of infrastructure in the rural areas through programmes such as the Comprehensive Agricultural Support Programme, have registered limited impact on the lives of many emerging farmers.

Even though the development programmes have been active for the past years, no evidence exist to show that any study have been undertaken to assess the effectiveness of this programmes in Bronkhorstspruit in terms of growth and development enhancement and whether or not the objectives of the programmes were achieved in the region. It is against this background that this study was conducted to assess and document the impact of agricultural support programmes in different farming enterprises and whether the interventions improved farming activities.

2. MATERIALS AND METHODS

2.1 Study area

The study was conducted in Tshwane Municipality of Gauteng Province in Bronkhorstspruit, a small town situated at 50 km east of Pretoria, Gauteng, South Africa. It lies on the border between the Gauteng and Mpumalanga provinces. Bronkhorstspruit falls under region 7 of Tshwane (figure 1). According to Tshwane Economic agency region 7 has some of the best farming land in Gauteng and this is further supported by the significantly high location quotient for agriculture in region.

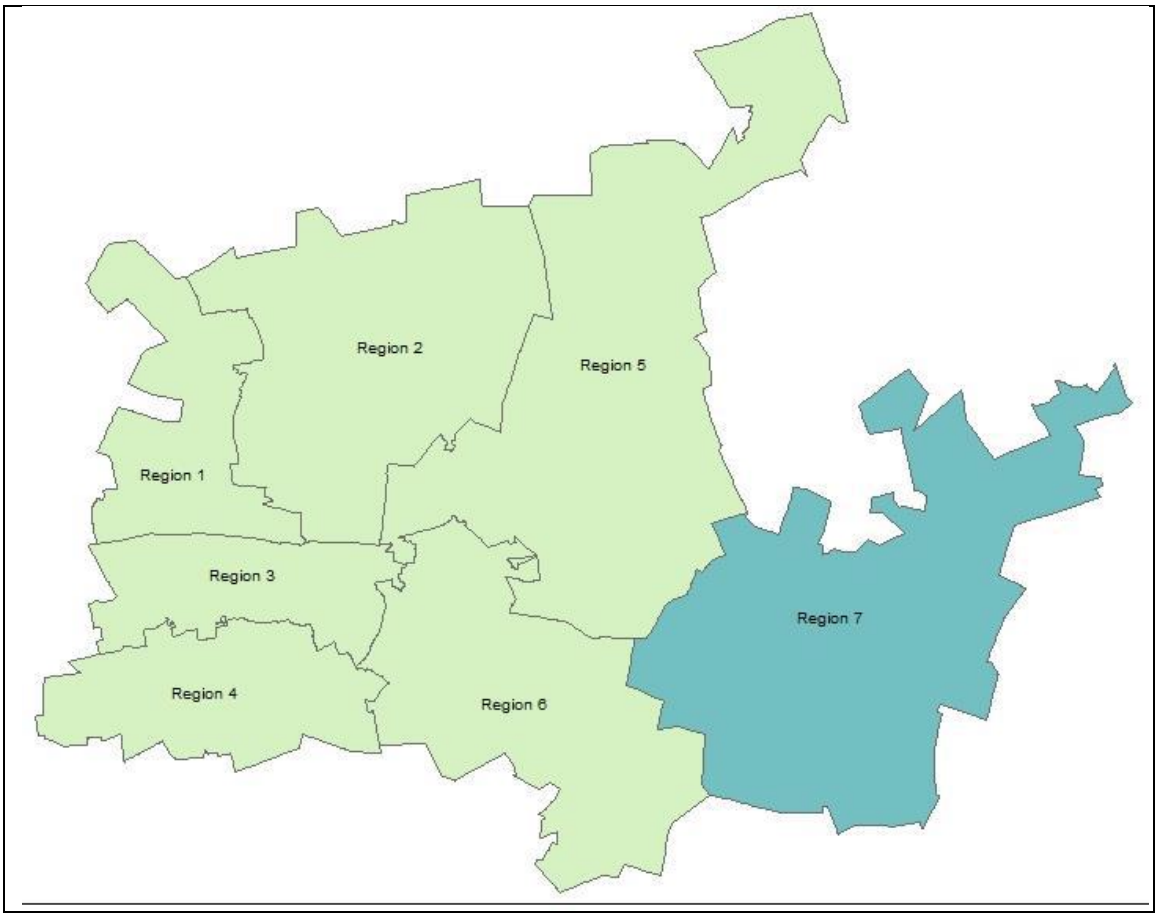


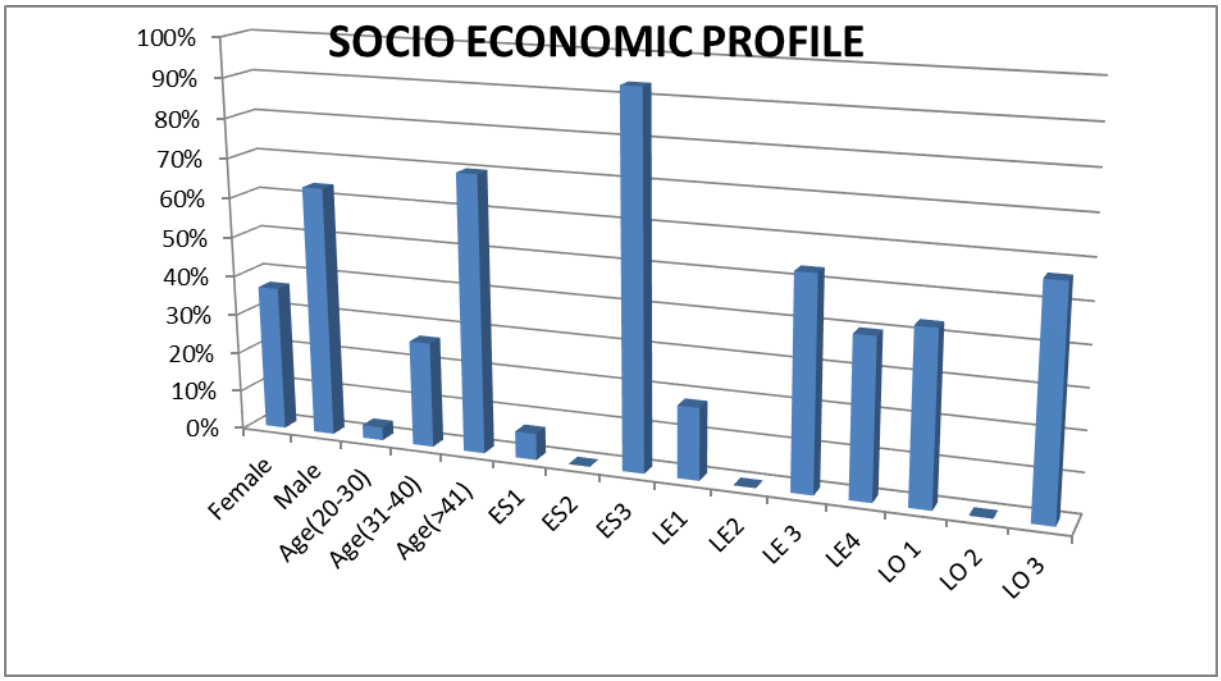
Figure 1: City of Tshwane Map position region 7 (Tshwane Economic Agency)

2.2 Data collection/ sampling informants

A purposive sampling method was used to choose a total of 30 smallholder farmers participating in the programmes to be part of the survey. Semi-structured questionnaires were used to interview the farmers. Interviews were conducted face to face with farmers during their commodity study group's sessions and farm visits. The questionnaires were divided into 4 sections namely: socio economic profile, information on institutional support, production information, Market information and job creation.

2.3 Socio-demographic description of respondents

A total of 30 farmers participating in developmental programmes were interviewed, of which 63% were males and 37% were females (Figure 2). Farmers participating in the programmes were aged between 20 to 70 years. The largest group consisted of farmers aged above 41 years. The majority of respondent are full time farmers and situated in state land owned (Figure 2).



Where ES=Employment Status (ES1=None; ES2=Employed; ES3=Fulltime farmer); Level of Education (LE1=None; LE2=Primary; LE3=Secondary; LE4=Tertiary); LO=Land Ownership (LO1=Private; LO2=Communal; LO3=State /Leased Land)

Figure 2: Socio economic profile of the respondent

2.4 Statistical analysis

Data analysis was performed using Microsoft Office Excel®, and descriptive statistics (percentages or proportions and frequencies) were presented. General Linear Model (GLM) procedure of MiniTab (2017) was used to analyse quantitative data; whereas means were separated using Fisher's Least Significant Difference (LSD) test.

3. RESULTS AND DISCUSSION

3.1 Institutional Support and Market Information

3.1.1 Impact evaluation

In addressing the post-settlement support and poverty level in the country, the Department of Agriculture introduced Comprehensive Agriculture Support Programme (CASP) and ILIMA LETSEMA programme in order to support the agricultural sector to deal with the situation of poverty in the country. DAFF (2017) reported that since the implementation of CASP in 2004/05, a total amount of R750 million has been allocated to this programme. Main aim of these programmes (CASP, Ilima Letsema) is to provide post settlement support to the targeted beneficiaries of land reform and to other producers who have acquired land through private means and are, for example, engaged in value-adding enterprises domestically or involved in export. Some of the expected outcomes for the programmes is to increase sustainable employment, reduce poverty, increase enterprise income and improve farming productivity/efficiency (Figure 3). Figure 3 shows the overall status of the projects before and after the interventions. More prominently, poverty reduction of 80 % and increased income among farmers (70%) who were interviewed are signs that the programmes are doing well in achieving some of the objectives.

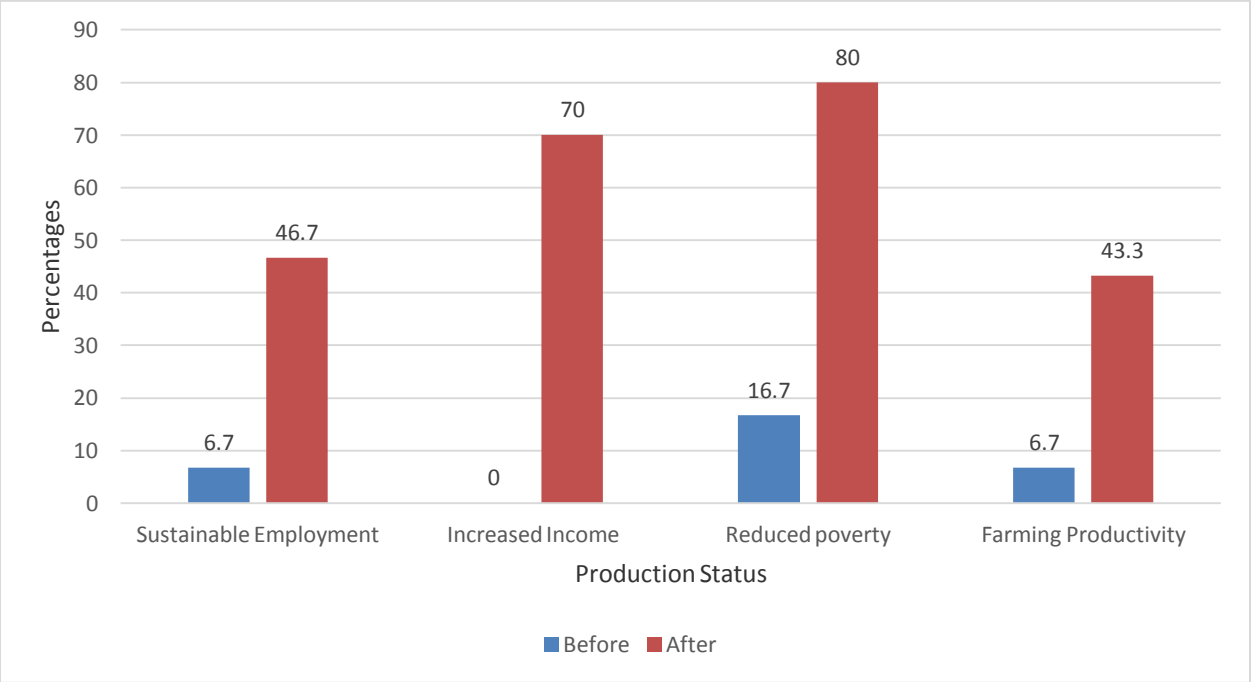


Figure 3: Farm projects status before and after the intervention

3.1.2 Status of the post-settlement Support per the enterprises

Different farming enterprises are being supported by the government programmes in Gauteng province through Gauteng Department of Agriculture and Rural Development. Beneficiaries who are participating in the programmes and volunteered to be part of the survey were poultry, piggery and maize farmers. Table 1 present the selected indicators of the production status against different farming enterprises before and after the intervention. As compared to other enterprises maize projects followed by piggery show the positive impact after the intervention. Maize is the most important grain crop produced in South Africa, serving as a food source for humans and animals, an input provider to other sectors, a source of job creation, a contributor of value added to the national economy, and an earner of foreign exchange (Vink & Kirsten, 2000). The maize project is thus the farming enterprise that must be supported and promoted in order to sustain its important function in the South African economy.

Table 1: Productive status (%) of the farming enterprises before and after the intervention

Production Status	Period	Poultry	Piggery	Maize
Sustainable employment	Before	0	20	0
	After	13,3	50	71,4
Increased Income	Before	0	0	0
	After	76,9	60	71,4
Reduced Poverty	Before	15,4	30	0
	After	76,9	80	85,7
Farming Productivity	Before	0	20	0
	After	23,1	60	57,1
Market Access	Before	23,1	0	0
	After	38,5	10	42,9

3.1.3 Different farming enterprises before and after the intervention by different programmes

Ilima/Letsema is a programme aimed at reducing poverty through increased food production initiatives and CASP is a programme aimed at expanding the provision of agricultural support services and promoting and facilitating agricultural development by targeting subsistence, smallholding and black commercial farmers from a previously disadvantaged background. CASP had six pillars namely; information and knowledge management; technical and advisory assistance; financing mechanisms, training and capacity building, marketing and business development and, lastly, on and off farm infrastructure. The study focused on one pillar of CASP, that of on-farm infrastructure. Since the programme came into effect in 2004, the focus had always been on infrastructure development, as transferred land most needed the infrastructure support (Xaba & Dlamimi, 2015).

As shows on the below tables (2, 3, 4) respondents of different enterprises participated in two government programmes. Most of the beneficiaries participated in Letsema only are the ones who are already in production and having their own infrastructure. The intervention was mainly for increased production while those who participated in both programmes are mainly not in production before the intervention or having poor infrastructure. The intervention was the on-farm infrastructure for poultry and piggery projects and production inputs after the construction of structures for those who participated in both programmes. Letsema improved employment opportunities and stimulated economic activities of the different farming enterprises. The most significant impact of the Letsema programme can be seen on Table 4, which shows the high impact on all the production status. Generally, the programmes improved the status of the different farming enterprises after the intervention.

Table 2: Productive status (%) of Poultry receiving different support programmes

Production Status	Period	Letsema	Letsema & CASP
Sustainable employment	Before	0	0
	After	33,3	28,6
Increased Income	Before	0	0
	After	33,3	100
Reduced Poverty	Before	0	28,6
	After	66,7	85,7
Farming Productivity	Before	0	0
	After	0	42,9
Market Access	Before	16,7	28,6
	After	50	28,6

Table 3: Productive status (%) of Piggery receiving different support programmes

Production Status	Period	Letsema	Letsema & CASP
Sustainable employment	Before	0	0
	After	80	0
Increased Income	Before	0	0
	After	60	60
Reduced Poverty	Before	60	0
	After	80	80
Farming Productivity	Before	40	0
	After	80	40
Market Access	Before	0	0
	After	20	0

Table 4: Productive status (%) of Maize receiving different support programmes

Production Status	Period	Letsema
Sustainable employment	Before	0
	After	71,4
Increased Income	Before	0
	After	71,4
Reduced Poverty	Before	0
	After	85,7
Farming Productivity	Before	0
	After	57,1
Market Access	Before	0
	After	42,9

3.2. Quantitative results for impact evaluation

Table 4 depicts the estimates reasons for income production in different farming enterprises. Ordinal logistic Regression of Minitab 17 where predictors included were type of programme, commodity, job creation, production capacity, annual income, market access, recommendations. The ordinal logistic regression shown that the association is statistically significant ($P<0.001$) for

increasing income in different farming enterprises. The logistic regression model identified the job creation, market access and production capacity as the main predictors of income increase in different farming enterprises.

Table 4: Odds ratio estimates reasons for income production in different farming enterprises

Predictor	Odd ratio	Lower CI	Upper CI
Programme (Letsema VS Letsema & CASP)	0,79	0,45	1,41
Commodity (Poultry, Piggery, Maize)	1,52	0,74	3,12
Job creation (Yes vs No)	0,41	0,21	0,78
Production capacity (Decrease vs increase)	0,98	0,50	1,90
Market access (Yes vs No)	0,57	0,18	1,74
Recommendations	1,72	1,13	2,61

CI: Confidence interval

Contrary to the findings of this study, Dension *et al.,* (2010) mentioned that despite significant progress in land redistribution in South Africa, there is evidence from a number of studies that agricultural production and income are not improving among the black smallholder population. Furthermore, a study conducted by the Mearns (2011:365-378) concluded that the majority of the land settlement programs, especially those operated by the smallholder and emerging farmers, have failed to get off the ground for various reasons, including the lack of technical know-how, poor business skills, conflicts among and within groups and insufficient.

Table 5: Least Square Means (LSM) of production indicators in different farming enterprises

Production indicator	Poultry		Piggery		Maize	
	Before	After	Before	After	Before	After
Annual Income (R)	21310^{b}	47619^{a}	33000^{a}	45000^{b}	17142.9^{b}	52857.1^{a}
Job Creation	2.08^{b}	2.99^{a}	2.5^{a}	3.2^{a}	2.42^{a}	$4.71a^{b}$
Production Capacity	$32,3^{b}$	19047.6^{a}	20.3^{a}	44^{b}	57.143^{b}	182.58^{a}

^{a,b} Row means with different superscript differ significantly (P<0.05)

Table 6: Least Square Means (LSM) of production indicators by programmes

Production indicator	Programme	Poultry		Piggery	
		Before	After	Before	After
Annual Income (R)	Letsema	24285.7^{b}	56666.7^{a}	40000^{a}	52000^{a}
	Letsema & CASP	18333.3^{b}	38571.4^{a}	26000^{a}	38000^{a}
Job Creation	Letsema	2^{b}	2.83^{a}	2.8^{a}	4^{a}
	Letsema & CASP	2.17^{a}	3.14^{a}	2.2^{b}	2.4^{a}
Production Capacity	Letsema	40^{b}	27428.6^{a}	20.6^{a}	50^{b}
	Letsema & CASP	28.6^{b}	10666.7^{a}	20^{a}	38^{b}

^{a,b} Row means with different superscript differ significantly (P<0.05)

The annual income, job creation and production capacity of all enterprises were significantly influenced by the programmes (Table 6). Enterprises performed better after the implementation of intervention programmes (Table 5). The findings of this study show that programmes in

Bronkhorstspruit resulted in productive and sustained farms, which results in increased income level. However, Aliber and Hall (2010) mentioned that while budgetary allocations to the sector have increased impressively over the last decade and a half, the distribution and use of these resources are such that few farmers benefit and the overall impact is small. They further suggested that a strategic choice has to be made between two strategies: supporting a few selected farmers to become large-scale commercial farmers ('accumulation for the few'), or supporting a large number and helping them to increase and diversify their produce so as to become sustainable commercial smallholders.

3.3 Market access before and after the intervention

Apart from providing supportive infrastructure, smallholder farmers need assistance in setting up appropriate marketing information systems so that they have access to market information regarding prices, market demand and other external information. Figure 4 show that majority of beneficiaries of government programmes still supply informal markers regardless of the intervention. Although these programmes are aimed and improving quality and volumes for smallholder farmers, Siwela & Mushunje (2013) reported that smallholder farmers are still in that dilemma of failing to produce good quality and higher volumes because of a number of constraints they faced. In fact, despite the numerous programme interventions to address the farmers' challenges, the reality is that these farmers still face several problems in accessing better paying markets

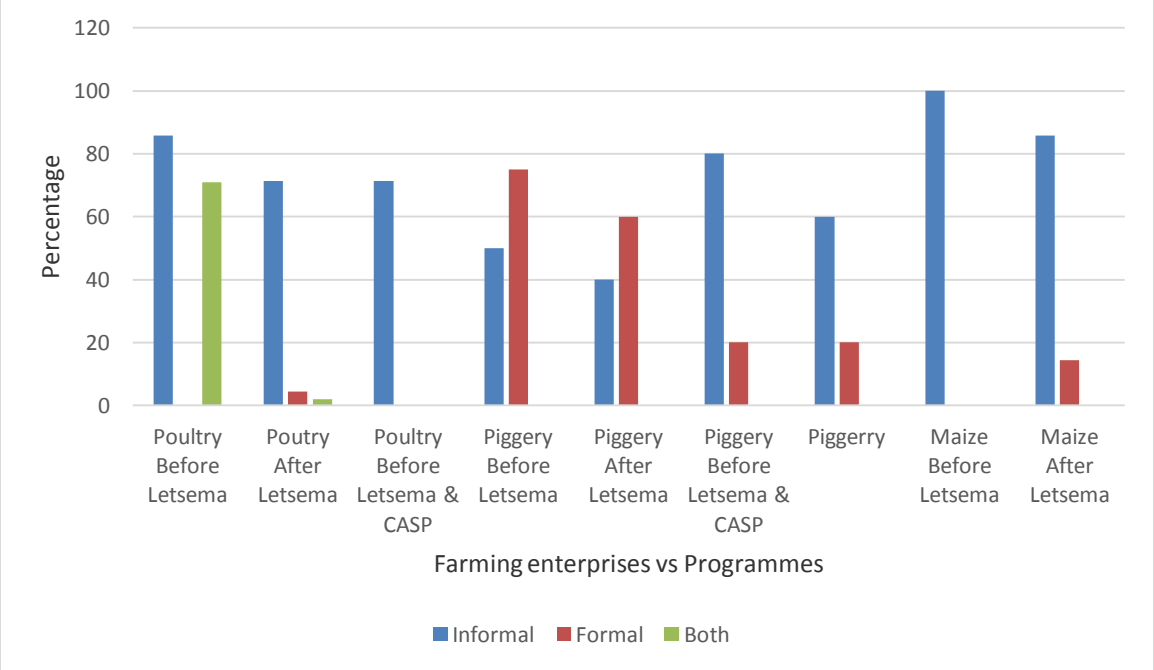


Figure 4: Type market for different enterprises before and after the intervention

4. CONCLUSION

The positive impact of government programmes on smallholder farmers in Bronkhorstspruit can be attributed to the improved net income, which in turn assists the project to be sustainable,

reduced poverty and thereby creating sustainable employment. The programmes are reaching most of its target groups, but relatively few youth and disabled persons were involved in the programme. It is imperative that there be an effort to reach out to the community members and help identify youth and women project that can be assisted through these programmes. The challenge was that programmes had achieved little progress in transforming the emerging farmers into commercial farmers. Both programmes were challenged in terms of volumes or quantity and the support to farmers was not comprehensive.

5. RECOMMENDATIONS

Inadequate support services on volume, quality, and the size-one fit all approach limit the progress / development of smallholder farmers in Bronkhorstspruit area. There is a need to constantly monitor the impact and the progress being made by these programmes. The underlying factors that contribute to youth and women not being involved in farming sector need to be reviewed. Priority need to be given to those existing women and young farmers project to attract more women and youth in agriculture. Collaboration among different stakeholders is imperative in creating significant opportunities for market linkages.

Acknowledgement

Authors acknowledge Bronkhorstspruit smallholder farmers for participating in the study and sharing their experiences on the government programmes.

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Back to Table of Contents

MY RESPONSIBILITIES AS A REGISTERED EXTENSIONIST WITH THE SOUTH AFRICAN COUNCIL FOR NATURAL SCIENTIFIC

PROFESSIONS (SACNASP) AND THE SOUTH AFRICAN SOCIETY FOR AGRICULTURAL EXTENSION (SASAE).

Terblanché, S. E.[29]

ABSTRACT

*Extension and Advisory Services in South Africa has been approved and registered as a field of practice and therefore as a Profession with SACNASP by the Minister of Science and Technology in January 2014. Registered extensionists must execute their tasks as professional extensionists according to the Natural Scientific Professions Act, 2003. **A** registered extensionist must understand and adhere to A Code of Conduct; have a clear understanding of professionalism, a profession and my responsibilities as a professional; and*

Continuously improve and enhance my knowledge and skills in the agricultural science and in the extension science. I must be registered with SACNASP and SASAE as Voluntary Association registered by SACNASP and it is my responsibility to ensure that my annual registration fees are payed with both SACNASP and SASAE. It is time to determine if I adhere to all the aspects mentioned to be a good professional and to determine my level of empowerment and or needs to be empowered as a registered professional in the Extension Field of Practice.

1. INTRODUCTION

Extension and Advisory Services in South Africa has been approved and registered as a field of practice and therefore as a Profession with SACNASP by the Minister of Science and Technology in January 2014.

The process of registration was started in 2014 and today 1,600,000 Extensionists are registered with SACNASP. However, 600 applications for registration are still pending because of insufficient information as requested by SACNASP. This aspect needs serious attention.

Registered extensionists must execute their tasks as professional extensionists according to the Natural Scientific Professions Act, 2003.

The main question today is:
What are my responsibilities as a registered extensionist with SACNASP and with SASAE?

A registered extensionistmust understand and adhere to the following aspects:

- A Code of Ethics or Code of Conduct;
- A clear understanding of professionalism a profession and my responsibilities as a professional; and
- Continuously improve and enhance my knowledge and skills in the agricultural science and in the extension science.

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2. A CODE OF ETHICS OR CODE OF CONDUCT

2.1 A description of ethics

Ethics describe a moral code or set of principles guiding human behaviour. In understanding the nature of ethics and their relationship to the law, a useful analogy is that of a wall. The solid bricks represent clearly defined and substantial laws and status. Ethics represent the mortar that fills the voids between the bricks. This helps to hold the wall together and give it additional strength. The weaker the mortar, the more likely it becomes that the wall will collapse.
According to Plant (2016), the basic concepts of ethics include:

- Who we are (personal identity), being a person of integrity, character and virtues (such as compassion, empathy and sympathy); and
- What we do (actions, conduct), doing what is good, right and fair.

Managing ethics is about preventing decent people from doing stupid things (Plant 2016, cited Alan Knott-Craig, former CEO of Vodacom).
The purpose of a code of ethics (or a code of conduct) is to:

- Protect stakeholders and enhance trust;
- Promote reputation;
- Prevent unethical behaviour;
- Promote ethical behaviour;
- Encourage ethical decision-making and provide guidance;
- Facilitate social integration; and
- Legitimise 'ethics' (Plant, 2016).

2.2 The SACNASP Code of Conduct

The SACNASP Council has drawn up the following Code of Conduct with which registered persons must comply. Failure to do so constitutes improper conduct. In practising their professions, they must:

- Have due regard to public safety, public health and public interest generally.
- Have due regard to harmful practices against the environment.
- Discharge their duties to their respective employers or clients effectively and with integrity.
- Conduct themselves in such a way as to uphold the dignity, standing and reputation of the natural scientific professions.
- Not undertake natural scientific work for which their education, experience or background have not rendered them competent to perform.
- Disclose to their respective employers or clients in writing:
    - Any interest which they may have in any company, firm or organisation, or with any person, and which is related to the work for which they may be or may have been employed: and
    - Particulars of any royalty or other financial benefit which accrues or may accrue to them as a result of such work.

- Not deliberately injure directly or indirectly, the professional reputation, prospects or business of another registered person.
- Not knowingly attempt to supplant another registered person after a formal offer of employment has been made.
- Not advertise their professional services in a self-laudatory manner or in a manner that is derogatory to the dignity of the profession.
- Not knowingly misrepresent or permit misrepresentation of their own or their associates' academic or professional qualifications, nor exaggerate their own degree of responsibility for any work of a natural scientific nature.
- Not, without a satisfactory reason, destroy calculations, documentary or any other evidence required for the verification of their work.
- Not personally, or through any agency, attempt to obtain consulting work by way of touting bribery.
- Order their conduct when practising their professions in another country in accordance with these rules in so far as they are not inconsistent with the law of the country concerned; provided that they shall also adhere to the standards of professional conduct in that country (www.sacnasp.org.za).

2.3 The SASAE calling and mission

The SASAE is a Scientific Society, which in the interest of its members is committed for the promotion of the science and vocation of Agricultural Extension, through its members.

The Society is registered with SACNASP as a Voluntary Association specifically responsible for the Continuous Professional Development (CPD) of registered extensionists with SACNASP and with SASAE. SASAE is responsible to register the applicant in the Science of Extension.

The objectives of the Society are:

- To advanced and apply the science and practice of Agricultural Extension within rural development as a scientific discipline by stimulating thought, study, research, discussion and the publication and exchange of knowledge both nationally and internationally.
- To promote professionalism, status and dignity of the Agricultural Extension Profession amongst members, the scientific fraternity, agricultural extension practitioners, the general public and with the studying youth.
- To practice the natural-, economic- and managerial sciences responsibly and in public Interest.
- To act as representative mouthpiece for the extension profession in agriculture. (www.sasae.co.za)

3. A PROFESSION, PROFESSIONAL AND PROFESSIONALISM

3.1 A profession explained

In the Oxford English Dictionary, a professional is defined as "the occupation, which one professes to be skilled in and to follow. A vocation in which professed knowledge of some branch of learning is used in its application to the affairs of others, or in the practice of an art based upon it".

Professions Australia (undated) define a profession as a disciplined group of individuals who adhere to ethical standards and who hold themselves out as, and are accepted by the public as possessing special knowledge and skills in a widely recognised body of learning derived from research, education and training at a high level, and who are prepared to apply this knowledge and exercise skills in the interest of others. A code of ethics governs the activities of each profession.

3.2 A professional clarified

A professional is a member of a profession or any person who earns their living from a specified professional activity. The term also describes the standards of education and training that prepare members of the profession with the particular knowledge and skills necessary to perform their specific role within that profession (Wikipedia, undated).

A professional often possesses a special set of skills in a chosen field, acquired through training, experiences, knowing and practice and that can be demonstrated by qualifications or accreditation of some kind.

Some qualities of a good professional:

- Technical expertise
  A good professional:
  - Is master of the knowledge, expertise and skills;
  - Is technically competent, can do the job and can do it well;
  - Seeks to continue learning;
  - Seeks advice as needs from other professionals; and
  - Is interested in learning from anyone who can help to expand their knowledge.
- Integrity
  A good professional:
  - Is fair in dealing with others and honours their commitments even when it might seem contrary to their own advantages.
- Ethics
  A good professional:
  - Act ethically in all their work and dealings with others;
  - Obey the civil law, including regulations that apply to the particular profession; and
  - Not cooperate with others who seek to act in an unethical way or seek to break the law.
- Advancing the profession
  A good professional:
  - Tries to innovate within the profession so that the profession improves its services;
  - Will collaborate with others in the profession when necessary;
  - Wants ethical norms to be lived in the profession and will work to ensure that they are; and
  - Takes an interest in the professional community; tries to promote solidarity among those practising the profession and will seek to be involved in professional societies and to help younger members to develop.

- Integration of professional and personal life
  A good professional:
  - Understands that professional work is part of their life and not the whole of their life; does not neglect other aspects of life (e.g. family, culture and religion); and
  - Avoids commitments that will not allow them to fulfil other basic commitments.
  - (Source: Elmbrook 2015: http://www.elmbrookcenter.org/our-philosophy/qualities-of-a-good-professional/)

3.3 Professionalism simplified

In simple terms, according to the Merriam-Webster dictionary, professionalism can be defined as "the conduct, aims, or qualities that characterise or mark a profession or a professional person".

The general view is that professionalism is associated with honesty, accountability and responsibility as well as high level of excellence.

According to Smallbusiness.chron.com (2017) the ten characteristics of professionalism are:

- Appearance: A professional is neat in appearance and pay special attention to your appearance when meeting with prospects or clients.
- Demeanour: be confident, polite and well-spoken and you need to keep calm even during tense situations.
- Reliability: find a way to get the job done.
- Competence: strive to become an expert.
- Ethics: adhere to a code of ethics.
- Maintaining your poise: even when facing a difficult situation.
- Phone ethic: identify yourself by full name, company and title.
- Written correspondence: keep your letters brief and to the point.
- Organisational skills: your work area should be neet and organised.
- Accountability: professionals are accountable for their actions at all times.

3.4 Competencies

A competency according to Athey and Orth (1999:216) is: "a set of *observable* performance dimensions, including i*ndividual* knowledge, skills, attitudes, and behaviours, as well as *collective* team, process and organisational capabilities, that are linked to *high performance*, and provide the organisation with *sustainable competitive advantages*".

i) What every extension worker should know- Core Competency Handbook (Suvedi and Kaplowitz, 2016)
   Core competencies of Extension Workers:
   - Planning an Extension Program
   - Program Implementation
   - Program Evaluation in Extension
   - Communication in Extension

ii) Core competencies for Extension Professionals in Nepal (Suvedi and Ghimire, 2015)

- Program planning and implementation
- Communication skills
- Education and informational technology
- Leadership
- Diversity, pluralism and multiculturalism
- Program evaluation and research
- Extension and organisational management
- Professionalism
- Technical subject matter expertise

iii) University of Nebraska Lincoln Extension Educator Competencies for the 21st Century (2005)

- Successful Teacher;
- Subject Matter Competent;
- Skilled Communicator;
- Inclusiveness;
- Entrepreneurial skills;
- Collaborator/Team Player;
- Leadership skills;
- Balance professional/personal time;
- Change Manager;
- Professionalism; and
- Citizenship of the organization.

iv) What every extension worker should know- Core Competency Handbook (Suvedi and Kaplowitz, 2016)

The characteristics of extension workers (p.30-31)

- Plan well
- Coordinate and collaborate to implement
- Be humble
- Communicate confidently
- Build public relations
- Value the diversity
- Acquire educational and informational technology
- Evaluate to show results
- Update knowledge

v) The New Extension Learning Kit (NELK) (www.g-fras.org/nelk.html)

The NELK is a learning resource for individual extension field staff, managers and lecturers. It focusses on functional skills and contains of 16 modules that have been identified by the GFRAS Consortium on Extension and Training as core competencies for individual extension agents.

The modules are:

- Introduction to the New Extensionist
- Extension approaches and tools

- Agricultural Extension Programme Management
- Professional Ethics
- Adult Learning for Behavioural Change
- Basic Knowledge Management and Extension
- Introduction to Facilitation for Development
- Community Mobilisation
- Farmer Organisational (FO) Development
- The role of Extension in Value Chains
- Agricultural Entrepreneurship
- Gender and Extension and Advisory Services
- Risk Management and Adaptation in Extension and Advisory Services
- Developing Capacity for Evaluation of Rural Extension and Advisory Services
- Policy Advocacy for Rural Advisory Services
- Nutrition – Sensitive Extension

3.5 Continuous Professional Development (CPD)

Every professional registered extensionist must annually and over a period of five years indicated how he/she did improve their skills and knowledge in the Extension Field of Practice.

A CPD Committee consisting of members from SASAE, DAFF and SACNASP, considered the CPD credits for each category as in the SACNASP CPD Policy. The recommendations from the Committee are indicated below.

CPD credits must be obtained in at least two of the three categories listed below, with at least 5 credits per five-year cycle from Category 1. The maximum credits, which may be accumulated annually in each category is also indicated.

Category 1 Activities (Developmental activities):

- **Conferences** - If 2 days or longer, 2 CPD Credits (can be conference of extension- or agricultural science).
- **Refresher courses** - Extension and Agriculture, 1 CPD Credit per day. Members should attend one refresher course in extension and one in agriculture in 5 (five) years.
- **Symposiums** - 1 CPD Credit per day.
- **Large group workshops, Seminars & Lectures** - 1 CPD Credit per day.

The Committee agreed to only use "conferences" and not "congresses" as the two are closely related and may be confusing.

No Maximum credits.

Category 2 Activities (Work activities):

- **Natural Scientific work** - 1 CPD credit for 400 hours (Max 800hrs/2credits per year).
- **Mentoring of Candidate Scientists and Technicians**. This section will be further developed soon.

Category 3 Activities (Individual activities):

- Membership of SASAE (Voluntary Association) – 1 CPD Credit if paid up for that year.
- Other activities:
  - **Part-time lecturing** to undergraduate and postgraduate students - 1 CPD Credit for every 10 hours of lecturing.
  - **Supervision of students** undertaking postgraduate studies: 2 credits per year.
  - **Oral examinations of PhD students** - 1 CPD Credit for every 10 hours of active involvement.
  - **Evaluation of M dissertations and PhD theses by external examiners** - 2 CPD Credits per year.
  - **Evaluation of final year students by external examiners** - 1 CPD Credit per year per module.
  - **Publication of research in peer reviewed, DHET registered Journals** - a single author: 2 CPD Credits per publication. Where paper has a number of authors: 1 CPD Credit per publication per author.
  - **Publication of technical articles (DHET registered Journals)** - 1 CPD Credit per article published.
  - **Papers presented at conferences / poster presentations** -
  - For a scientific paper 1 CPD Credit. For a popular paper and for a poster 0.5 CPD Credit.
  - **Participation in statutory, professional, institutional, technical or non-technical committees or task groups** - 1 CPD Credit for every 10 hours of active participation.
  - **Evaluation of educational programmes at Universities, Universities of Technology (Technicon) and Agricultural Colleges for accreditation purposes** - 1 CPD Credit for every 10 hours of active involvement.
  - **Evaluation of educational qualifications for SACNASP's Qualifications Examination Committee** - 1 CPD Credit for every 10 hours of active involvement.
  - **Evaluation of competence and applications for registration for SACNASP's Registration Committees and Professional Advisory Committees** - 1 CPD Credit for every 10 hours of active involvement.
  - **Relevant additional qualifications (these are exceptional allocations)** - A completed postgraduate qualification: 5 CPD Credits.
  - **Self-study which includes, but is not restricted to studying of journals or electronic or computerised material** - 1 CPD Credit for every 10 hours of study. All activities under this item must be verified.
  - **SACNASP Referee Report** – 0.1 CPD Credit per report handed in. Maximum 2 CPD credits.

A maximum of **3 credits (30 hours)** may be accumulated under this portion of this category, with the exception stated above for postgraduate studies. (www.sacnasp.org.za)

4. PROFESSIONAL AGRICULTURAL ADVISORY SERVICES AROUND THE WORLD

The following outline examples of professional RAS from round the world and describes the way they are structured and operate.

4.1 Saskatchewan Institute of Agrologists (SIA) Canada (www.sia.sk,ca)

The Saskatchewan Institute of Agrologists is an organisation of university trained professionals that protects the public by ensuring its members are qualified and competent to provide knowledge and advice on agriculture and related areas. There is a principal body namely the Agricultural Institute of Canada (AIC) that supports and promotes Canada's professional and scientific capacity for agriculture. The Profession of Agrology is regulated by provincial legislation called the Agrologist Act, 1994 that provides the Saskatchewan Institute of Agrologists with the authority to make regular and administrative bylaws as outlined in the Act. The Act varies from province to province and each institute has their own membership criteria, fees and standards.

SIA REGULAR BYLAWS:

a) BYLAW I: Membership - Classes of membership
b) BYLAW II: Code of Ethics
c) BYLAW III: Meetings of the Institute
d) BYLAW IV: Continuing Professional Development
e) BYLAW V: Standards of Practice
f) BYLAW VI: Discipline

4.2 European Forum for Rural Advisory Services (EUFRAS)

Certificate for European Consultants in Rural Areas (CECRA):
The CECRA Cooperation and Usage Agreement between IALB (Internasionale Akademie Land- und hauswitrschaftlicher Beraterinnen und Berater) was signed in 15 June 2015. The EUFRAS-CECRA office was established in October 2015. CECRA is a qualification and development for consulting personnel in the rural areas of Europe to increase the professional didactic skills especially:

- Methodological skills;
- Communicative and Social skills; and
- Personal skills.

The content consists of two (2) compulsory modules and at least three (3) of the 13 elective modules. The requirements for the Certificate are:

- Completed degree course or completed vocational training;
- Two years of professional experience in advising;
- Conformation of completed modules;
- Attendance of:
- An event in another country and
- -A visit to an advisory organisation in another country.
- Final thesis (case study with self - reflection).

4.3 United States

There are a number of professional associations in the United States. According to Harder (GFRAS Scoping Study Questionnaire, 2016) the National Association of Extension Program & Staff Development Professionals (NAEPSDP) is the most appropriate organisation for understanding more about professional development (https://naepsdp.tamu.edu/).
The objectives of the Association are to:

- Improve communication and collaboration by discussing issues, needs and opportunities of mutual interest and building and sharing resources.
- Advocate for the profession by promoting its importance within the land grant system.
- Enhance multi-state efforts.
- Discuss, develop, sponsor, and promote educational training programs and activities that advance sound program and staff development practices.
- Advance the professional status of program and staff development extension professionals by encouraging continuous self-improvement.

The membership of the Association shall be comprised of Extension professionals in each state. The recognised classes of membership are:

- Active Members
- Life Members
- Student Member

Bylaws of the NAEPSDP:
Article I: Membership and fees
Article II: Officers and Board members
Article III: Committees
Article IV: Guiding Documents
Article V: Governance
Article VI: Amendments to the Constitution and Bylaws
Article VII: Elections
Article VIII: Strategic Partnerships
Article IX: Dissolution of the Association

5. CONCLUSION: MY RESPONSIBILITIES AS A PROFESSIONAL EXTENSIONIST IN SOUTH AFRICA.

- I must be registered with SACNASP and SASAE as Voluntary Association registered by SACNASP
- It is my responsibility to ensure that my annual registration fees are payed with both SACNASP and SASAE – my name and number is on the card not the organisation I am working for.
- As a good professional I am:
  → A master of knowledge, expertise and skills.
  → Technically competent and can do the job and do it well.
  → Complying to the SACNASP Code of Conduct and therefore act ethically in all the work and dealings with others.
  → Neat in appearance especially when meeting with clients.

→ Polite and well-spoken and stay calm during tense situations.
→ Reliable and respond to clients promptly.
→ Competent and strive to be an expert in my field and continuously improve my skills and knowledge through a process of CPD.
→ Accountable for my actions at all times.
→ Honest, decent, fair, trustworthy, law-abiding and of a good character.

- It is time for me to close my office door and to determine if I adhere to all the aspects mentioned to be a good professional.
- It is time to determine my level of empowerment and or needs to be empowered as a registered professional in the Extension Field of Practice.
- It is recommended that each one of us should complete a checklist to determine my current level of skills and knowledge (including my qualifications) and what should I do or need to do to improve my knowledge and skills.
- It is recommended to establish a committee in each province that will take the responsibility to support extensionists in the process of professionalization and to communicate problem areas with the SASAE Board that will take it up with SACNASP.

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Back to Table of Contents

THE IMPACT ASSESSMENT OF MINIMUM TILLAGE TECHNOLOGY ON SMALL-SCALE FARMERS IN MHLONTLO LOCAL MUNICIPALITY (LOWER KROZA AND SAMARIA MAIZE PROJECTS).

Sifici, N. E.[30] & Zwane, E. M.[31]

ABSTRACT

Agribusiness in creating nations faces numerous difficulties, for example, supporting sustenance generation, limiting natural effects and keeping up monetary feasibility. New types of agribusiness have created as of late to address these difficulties. Least culturing innovation was one of the soonest types of farming which attempted to adjust the requests of nourishment creation with ecological maintainability. The goal of the paper is to address the issues of country little scale agriculturists in creating regions, for example, Lower Kroza (Ndwane) and Samaria in the Eastern Cape Province. Both likelihood and non-likelihood examining strategies were utilized to choose two towns and 200 respondents were talked with June 2013. Information was gathered from field review through utilizing semi-organized surveys. The examination depended on the effect of the base culturing innovation honed by rustic little scale ranchers in Mhlontlo neighbourhood region focused on adjusting financial prosperity of family units and natural advantages. Distinct and inferential measurements through utilizing SPSS program were connected to examine the information. Discoveries of the examination demonstrate that 37% of respondents demonstrated that base culturing innovation has an effect through a change on financial prosperity in Lower Kroza (Ndwane) and Samaria people group. Again, the effect of least culturing innovation hones has additionally enhanced up to 23% on nourishment security, destitution lightening on defenceless families and diminishment of on ecological corruption among rustic arable terrains. In conclusion the discoveries additionally demonstrate that 23% of respondents reaffirmed that effect has enhanced agronomic practices and land debasement administration rehearses. All in all, it can in this manner inferred that respondents in Lower Kroza (Ndwane) and Samaria people group saw that the effect of Minimum culturing innovation rehearses has enhanced in their family units from their cultivating endeavours (Maize ventures), particularly with respect to vocation and nature of soundness of the general population in light of harvest yield, quality and manageable maize ventures. In conclusion, however not slightest, the effect on job family in the investigation regions was additionally talked about which depended on monetary prosperity, for example, edit yield, work constrain, sustenance security, destitution decrease and soil fruitfulness. The change of financial prosperity affected families in their basic leadership to partake on least culturing innovation hones. This pattern can advance full interest of ranchers on the development presented by the Government of Eastern Cape Province (Senior Agricultural Advisors). The discoveries demonstrate that nourishment security, protection of regular assets, scattering of helpful data, manageability of undertakings, and strengthening of cultivating bunches are prescribed. The paper finishes up by proposing a few

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suggestions on how least culturing can better be used so as to accomplish supported outcomes in country improvement.

Key words: Food production, minimum tillage technology, sustainability and environment

1. INTRODUCTION

1.1 Introduction

Soil disintegration is one of the issues of country little scale agriculturists in numerous creating nations, particularly in Sub-Saharan Africa. Land corruption and soil disintegration went with the data of substantial gulleys which result and reach to a disturbing rate in the Eastern Cape. The fundamental driver of land debasement has been accounted for to be nonstop if regular culturing is polished. Conservation agriculture (CA) is said to build edit yield, decrease work costs, enhance sustenance security, lighten neediness, diminish soil disintegration, and enhance soil wellbeing and prosperity (Soil ripeness, soil surface and soil structure).

1.2 Research problem

Soil disintegration influence little scale agriculturists because of soil corruption in their fields, least culturing innovation is a signicant cultivating practice since it is planned to preserve, enhance and make more effective utilization of characteristic assets through coordinated administration of accessible soil, water and natural assets joined with outer data sources (Erwin, 2007). This adds to ecological protection and to improved and maintained agrarian creation. It can likewise be alluded to as asset productive or asset powerful agribusiness (FAO, 2006). This is one of the advances that ranchers can use with a specific end goal to have an economical and ecologically cordial rural creation.

As a cutting-edge farming practice in rural creation researchers have distinctive perspectives and contentions concerning preservation horticulture when contrasted with ordinary agribusiness which is the conventional method for edit generation. In some past examinations in regard to the selection of least culturing innovation or protection farming it has been discovered that there is no financial distinction amongst ordinary and preservation horticulture, along these lines there is no monetary motivator to switch advances (Janosky et al., 2002). A few scholars (Ribera, 2004 and Janosky et al. 2002) contended that there is no essential variety in the financial execution between least culturing and traditional culturing innovation hones. The presence of the level-headed discussion builds up a data hole on the financial execution and motivations of least culturing innovation when contrasted with customary horticultural practices that should be filled. This examination is subsequently, centred around investigating the financial execution of least culturing innovation when contrasted with ordinary culturing innovation hones.

1.3 Objectives of the paper

The goal of the paper is to address the issues of small-scale farmers in Lower Kroza (Ndwane) and Samaria in the Eastern Cape Province. The examination depended on the effect of the base culturing innovation rehearsed by small-scale farmers in Mhlontlo local focused on adjusting financial prosperity of family units and ecological advantages.

2. LITERATURE REVIEW AND THEORETICAL BACKGROUND:

Agribusiness is the foundation of the economy which contributes around 40 percent of Gross Domestic Product (IFAD, 2012a). The world will require in the vicinity of 70% and 100% more nourishment security by 2050 to sustain 9 billion or more individuals with less land, water and vitality accessible, while causing significantly less debasement and contamination of normal emotionally supportive networks (Paoletti et al. 2011). Horticulture is considered as an imperative device of financial development and neediness decrease, and its part in destitution lessening is legitimized by the way that rustic neediness is across the board and somewhere down in provincial territories. The agrarian part assumes a vital part in giving jobs (i.e. a business and financial base for families) around the world. All in all, this part gives job to 40% of the total populace (20% in South Africa). The Eastern Cape Province is tested by far reaching neediness which influences destitute individuals in the provincial zones. The absence of employment creation and salary insecurity implies that numerous family units are greatly defenceless against numerous issues related with neediness, for example, weakness care and absence of access to essential assets for good personal satisfaction and prosperity. Horticulture is the arrangement of rural difficulties related with poor execution on rural profitability and soil corruption in little scale agriculturists especially in the Sub-Saharan Africa (Giller, 2009).

Least culturing, is characterized as a culturing framework which incorporates the base soil aggravation required for edit generation" (Derpsch, 2001a). It can likewise be characterized as the base measure of soil aggravation which can be accomplished utilizing the hardware accessible to the agriculturist. By and large, least culturing is implied here as a one-pass culturing task that sows synchronously. It is related with seed arrangement, normally accomplished utilizing full cut-out focuses, full cut-out one-way focuses or balance plates, to separate the whole soil surface (FAO, 2001a). It might incorporate a shallow development between seasons to control weeds when it might be called diminished culturing (FAO, 2001b). A base culturing framework ought to aggravate the dirt adequately as far as the developed width and profundity of each column, to give some weed control and a suitable soil tilth for seedling rise. This aggravation ought to be accomplished in one pass, attendant with seeding. Least culturing has focal points, for example, soil disintegration control and less work costs and less hardware costs. Least culturing innovation (MTT) is essential for upgrading nourishment security in creating nations, and empowering maintainable monetary development. Least culturing innovation rehearse was right off the bat actualized in South America (Brazil) in the mid-1970s, for the most part as a response to extreme water disintegration conditions (Derspsh, 2001b). Least culturing innovation started in Brazil and Argentina in South America, spread to Europe (Netherlands), South Asia, and Australia, Sub-Saharan Africa (Botswana, Kenya, Malawi, Mozambique, Nigeria, Zambia, and Zimbabwe) before it was actualized in South Africa (Limpopo, KwaZulu-Natal and EC). The administration of Eastern Cape has in this manner worked effectively to modernize the agrarian part from obsolete furrowing practices of utilizing customary and ordinary cultivating strategies. New procedures have been considered as a fundamental piece of the answer for increment the efficiency. The modernization of ranch advancements has in this way been supported by charge decreases, changes that permits cultivate amalgamation, advancements of homestead associations, and changes that have lessened the protectionism on residential hardware and strategies (Chen & Duncan, 2008). These changes

have empowered an inflow of new imaginative innovation and apparatus from remote nations toward the Eastern Cape Province.

2.1 Adoption of minimum tillage technology

The decentralization of expert and the expanded self-governance of little scale agriculturists fused with the institutional change that permits an inflow of new innovation and have reaffirmed the selection choice of new advancements from the previous specialists to the individual and little scale ranchers (Zheng, 2012 and Fan, 1991). This has empowered the little scale agriculturists to exploit new innovation to comprehend nearby and social issues in the general public**.**

2.2 Impact to Food Security

The principle motivation behind this exploration examine needs to evaluate the effect of least culturing innovation on little scale agriculturists towards nourishment security in Mhlontlo nearby region. Sustenance weakness is as yet an incredible test in different family units in South Africa (Abdu-Raheem, 2011). Creating sustenance security, particularly nourishment security family unit, is overall recognized as a noteworthy development in propelling the vocation of the provincial poor. One site towards understanding this is through little scale ranchers, which can be sustained through a fitting inventive innovation (Abdu-Raheem, 2011). Sustenance security is a circumstance that exists when all individuals, constantly, have physical, social and financial access to adequate, protected and nutritious nourishment that meets their dietary needs and sustenance inclinations for a dynamic and sound life" (FAO, 2010:8a). This circumstance is associated with the abnormal state of neediness that exists in the nation, especially in rustic regions. The administration (Extension officers) is especially all around situated to address nourishment instability and neediness through the devices of innovation exchange and advancement, human capital improvement, social capital improvement and expanding market get to (Abdu-Raheem, 2011). Malnourishment, craving and starvation influence numerous individuals everywhere throughout the world (FAO, 2003a). Roughly 2.5 billion individuals on the planet rely upon the rural segment. In numerous creating nations, horticulture is the fundamental instrument for financial development (FAO, 2010b). In South Africa, horticulture can be a key apparatus for the monetary advancement and development of the considerable number of regions (Ndlovu, 2013). Rustic neediness has noteworthy difficulties in South Africa (Laker, 2004). Numerous African nations including South Africa are looked with nourishment frailty which prompts neediness of Africa differed starting with one zone then onto the next, contingent upon numerous components, for example, regular asset blessings, foundation, political dependability, social and financial condition (Akeredolu, 2008).

3. RESEARCH METHODOLOGY

The paper forms part of two study areas in Qumbu sub-district. The sample was purposively selected in two villages under Mhlontlo local municipality, Eastern Cape Province as shown in Table 3.1.

Table 1: Sample size of respondents

Name of villages	**Number of respondents**	**Percentage**
Lower Kroza (Ndwane)	120	60
Samaria	80	40
Total	**200**	**100**

Source: Survey, (2014)

This paper is derived from household field survey which was conducted in Lower Kroza (Ndwane) and Samaria households. Data was collected on the impact assessment of minimum tillage technology. The study area is situated under the jurisdiction of Mhlontlo local municipality. The study was focused on the comparison of minimum and conventional tillage technology practices, based on socio-economic and environmental benefits. The survey method of research was adopted by the above-mentioned communities, which also includes a semi-structured questionnaire to collect data from a sample size of 200 respondents.

4. RESULTS AND DISCUSSION

4.1 Minimum tillage

Least culturing, is characterized as a culturing framework which incorporates the base soil unsettling influence required for trim generation (Derpsch, 2001a). It can likewise be characterized as the base measure of soil unsettling influence which can be accomplished utilizing the gear accessible to the agriculturist. A base culturing framework ought to bother the dirt adequately as far as the developed width and profundity of each line, to give some weed control and a proper soil tilth for seedling rise. This aggravation ought to be accomplished in one pass, attending with seeding.4.2 Impact of minimum tillage.

The Eastern Cape Province is challenged by widespread of food insecurity and poverty that affect poor people in the rural areas. The lack of job-creation and income instability means that many households are extremely vulnerable to many problems associated with poverty such as poor health care and lack of access to basic resources for good quality of life and well-being. Agriculture is the solution of agricultural challenges associated with poor performance on agricultural productivity and soil degradation in small-scale farmers particularly in the Sub-Saharan Africa (Giller, 2009). The respondents were asked to indicate the impact of minimum tillage and the findings are as follows in Figure 4.1. The findings in Figure 4.1 below show that 44% of the MTT participants had positive attitudes towards participation in minimum tillage technology practices as compared to while only 29% of the non-participants highlighted, they had a positive attitude towards participation in minimum tillage technology practices. Sixty six percent of the non-participants had negative attitudes towards participation in minimum tillage technology practices, while 71% had negative impact in minimum tillage technology approach.

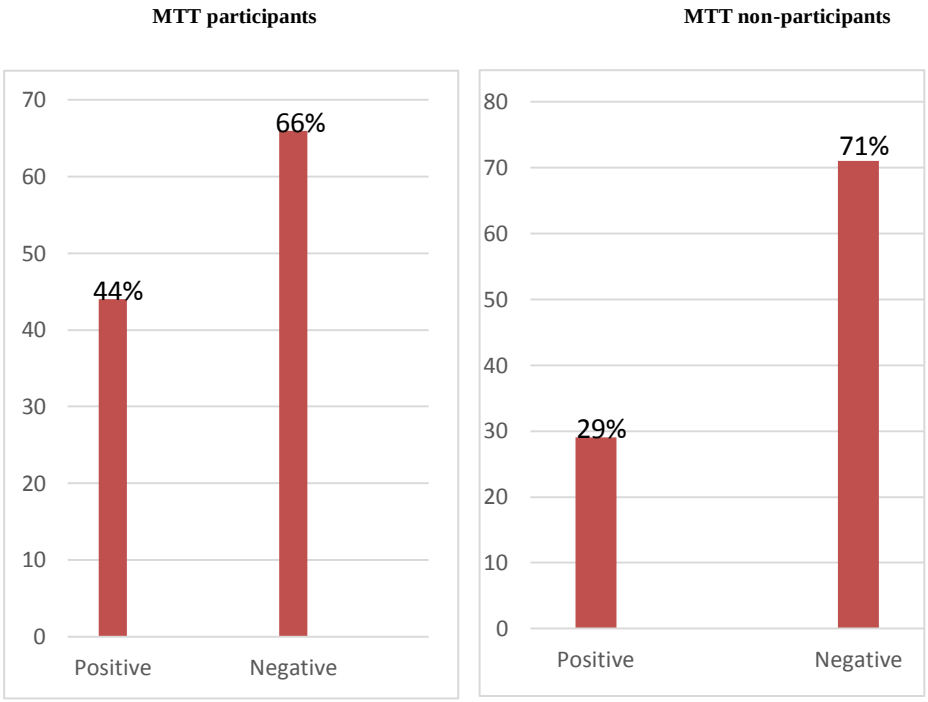

Figure 1: Impact of Minimum Tillage Technology
Source: Survey, (2014)

4.3 Impact of minimum tillage on livelihood of household economic well-being in the study areas

The effect of least culturing on business of family financial prosperity is critical despite the fact that it is hard to examine the monetary effect in country territories, particularly for little scale ranchers since it is uncommon to get data as far back as the general population in rustic regions don't frequently keep rural cultivating records. The aftereffects of the investigation are exhibited in Table 4.1. The outcomes exhibited in Table 4.1 express that the occupation of family monetary prosperity was enhanced by 23% after the presentation of least culturing innovation in Lower Kroza (Ndwane) and Samaria families. The discoveries likewise show that the commitment in family monetary prosperity was great and imperative. The respondents had revealed that there was a positive effect on vocation of monetary prosperity after the presentation of least culturing innovation in both investigation zones.

Table 2: Impact of MTT practices on Socio-economic status (food security, poverty reduction and soil fertility) of households in Lower Kroza (Ndwane) and Samaria

Variables	**MTT respondents**	**Response (%)**
Food Security, Poverty & Soil Fertility	46	23

Source: Survey, (2014)

5. COMPARISONS OF MINIMUM TILLAGE TECHNOLOGY AND CONVENTIONAL TILLAGE TECHNOLOGY PRACTICES IN LOWER KROZA (NDWANE) AND SAMARIA HOUSEHOLDS

5.1 Introduction

Least culturing and traditional culturing innovation rehearses were for the most part distinguished and tried in Lower Kroza (Ndwane) and Samaria little scale agriculturists as the best administration hones if oversaw legitimately. Amid the meetings, respondents are guided to look at least culturing innovation and ordinary culturing innovation rehearses by giving their viewpoint advantages of least culturing innovation in light of the financial marvel. They were likewise asked for to make proposals and suggestions as how least culturing innovation practices can be dealt with as an elective practice and end up helpful in future.

5.2 Comparisons of minimum tillage technology and conventional tillage Technology practices in Lower Kroza (Ndwane) and Samaria households

The investigation demonstrates that respondents had got examinations between least culturing innovation and regular innovation hones in view of the social and monetary status. The factors, for example, age, sex, instructive level and work are the determinants of any development presented on the chose zones.

5.2.1 Social cohesion, stability and justice in Lower Kroza (Ndwane)

The effect of MTT hones on societal position of family units in Lower Kroza (Ndwane) included social attachment and strength, group investment in the task, social connections of group individuals; value in sharing venture advantages and access on accessible assets; wellbeing and prosperity change. The wrongdoing rate, abusive behaviour at home issues were decreased and affected on wellbeing and welfare of the groups. Different elements included were choice interest in the undertaking, employment, neighbourhood learning and encounters and furthermore new information connected to the group. The discoveries are appeared underneath in Figure 5.1, demonstrated that every one of the factors said increased 83.3% in upgrading societal position in Lower Kroza (Ndwane) people group under least culturing innovation hones. The respondents expressed that social attachment and steadiness were enhanced in light of the fact that a presentation of MTT rehearses diminished wrongdoing rate, debate and enhanced dependability in the aggressive behaviour at home difficulties. The families redesigned their social connections through rancher to agriculturist approach in exchanging augmentation data. The family work was expanded as the method for supporting each other. The outcomes additionally demonstrated that the family unit's wellbeing and prosperity were enhanced in light of the fact that their work styles changed since they expended crisp maize and items, for example, samp and porridge in their eating routine point of view. The family units rejected maize and its items from their basic need list. There was a diminishment of acquiring maize and its items from different providers. Indeed, even the family's creatures were bolstered by maize and maize stalks in Lower Kroza (Ndwane). The family units had a chance of showing signs of improvement salary and benefit from this undertaking. There was arrangement of nourishment security and furthermore neediness decrease. The respondents likewise demonstrated that a presentation of MTT hones in Lower Kroza (Ndwane) were including an incentive into their

nearby information and encounters. The family units picked up mentorship as a component of limit building (preparing) and the exhibition session enhanced their neighbourhood condition and abilities. The MTT members appreciated the mentorship procedure as they picked up the know-how of supposed 'Planting without plouwing' (PWP) approach through concoction application system. The basic leadership investment in the venture were completely and better enhanced through this development. Be that as it may, the CTT respondents uncovered 16.7% as the economic wellbeing commitment in Lower Kroza (Ndwane) people group.

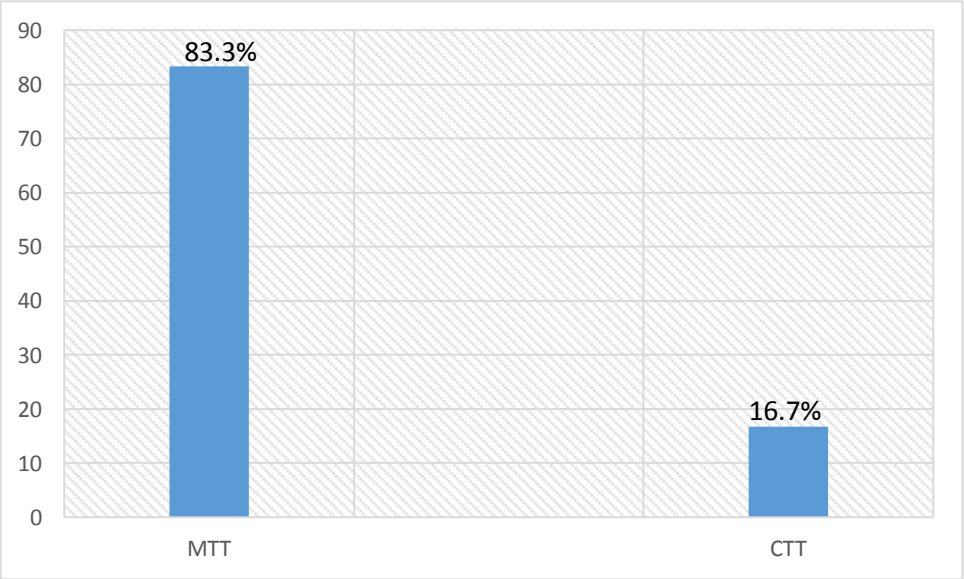

Figure 2: Impact of MTT practices on social status of households in Lower Kroza (Ndwane)
Source: Survey, (2014)

5.2.2 Social cohesion, stability and justice in Samaria

The outcomes demonstrated that effect of MTT hones on societal position of family units in Samaria included social union and soundness, group interest in the venture, social connections of group individuals; value in sharing undertaking advantages and access on accessible assets; wellbeing and prosperity change. The components included were choice support in the task, work, nearby learning and encounters and furthermore new information connected to the group. The discoveries are demonstrated underneath in Figure 5.2 that the factors increased 90.6% in the societal position in Samaria people group under least culturing innovation hones. The members demonstrated that social attachment and steadiness were enhanced in light of the fact that a presentation of MTT rehearses lessened wrongdoing rate, debate and enhanced dependability in the family units' viciousness issues. The family units expanded their social connections through agriculturist to rancher approach in exchanging expansion data. The family work was expanded as the method for supporting each other.

The consequences also showed that the household's health and well-being were improved because their livelihood changed since they ate fresh maize and products such as samp and

porridge in their diet perspective. There was a decrease of purchasing maize and its products from other suppliers. Even the household's animals were fed by maize and maize stalks in Samaria. The households had an opportunity of getting better income and profit from this project. The food security was provided of food and poverty was also reduced. The respondents also revealed that an introduction of MTT practices in Samaria were adding value into their local knowledge and experiences. The households gained mentorship as part of training and the demonstration session improved their local environment and skills. The MTT participants enjoyed the mentorship process as they gained the know-how of planting without ploughing approach through chemical application method. The participation in decision-making in the project were fully and better improved through this innovation. The CTT respondents gained 16.7% as the social status contribution in Samaria village.

5.2.3 Impact on crop yield and income in Lower Kroza (Ndwane) and Samaria

The respondents in Lower Kroza (Ndwane) under minimum tillage technology (MTT) demonstrated better pay of accepting R10 920.00 from offers of dry maize and devoured 66 sacks of dry maize as nourishment security arrangement when contrasted with R3 900.00 got by conventional tillage technology (CTT) respondents in 2011 and furthermore expended 20 packs of dry maize. The creatures were encouraged with 24 packs of maize. Be that as it may, in Samaria site, respondents under MTT cultivating got R1950.00 from 15 sacks of maize sold in 2013 and furthermore devoured the create of around 34 packs. Samaria ranchers additionally delivered 5 sacks of dry beans and ate every one of them as nourishment security and destitution diminishment. The respondents under CTT rehearses delivered 20 sacks of dry maize and devour every one of them as a major aspect of sustenance security and destitution lightening.

5.2.4 Impact of MTT practices on economic status (crop yield) of households in Samaria

In the families, maize and beans assume an essential part in foodstuff. The respondents in Samaria under MTT rehearses demonstrated that they figured out how to collect 2.5tons for each ha. The aggregate zone planted maize in Samaria was 6ha. That product yield was not expected but rather the unfriendly substantial precipitation influenced their yield. In Samaria, 15 sacks of dry maize were sold and R1950.00 turned into a wage got by the members. Aside from that, 66 packs devoured by the general population worried of destitution. That was an incredible sustenance security help. Once more, beans were developed in 1ha.and 5 packs of beans gathered in Samaria and devoured every one of them by family units.

5.2.5 Impact of CTT practices on economic status (crop yield) of households in Samaria

The respondents in Samaria under CTT rehearses demonstrated that they figured out how to reap 1tonne for every ha. In Samaria, 20 sacks of dry maize were expended against neediness by giving sustenance security help.

5.2.6 Impact of MTT and CTT practices on labour force

The discoveries expressed that 7% of MTT members were used as family work amid top season for motorization when contrasted with 2% of CTT members utilized as a part of Samaria. The

investigation likewise demonstrates that 6% of MTT members were utilized as employed workers for cultivating exercises while 2% CTT members used contracted work for agrarian activities. Keeping in mind the end goal to gather information on job resource portfolios and net pay of agriculturists are required, an example family unit measure review was led among 24 provincial families in Lower Kroza (Ndwane) in January to February 2014. The utilization of least culturing innovation rehearses cause less work when contrasted with traditional culturing innovation hones for exercises. The structure of family unit estimate is extremely critical in cultivating activities. The normal of Lower Kroza (Ndwane) MTT family measure added up to 7 individuals for every family unit, and 4 individuals in the CTT members. The cultivating exercises in MTT hones were less than CTT automation. For example, showering and planting are the fundamental exercises led in the MTT cultivating, improbable, in CTT works on, furrowing, discing, planting and splashing are the principle exercises. This implies CTT tasks require more work drive and furthermore costs too. For instance, 10% of MTT members frequently utilized family work in top circumstances for automation when contrasted with 7% of CTT members in Lower Kroza (Ndwane). The investigation additionally demonstrates that 2% of MTT members utilized employed workers for tasks while 5% of MTT CTT members used contracted work for motorization purposes. The respondents revealed that they had bring down work costs in least culturing innovation because of less activities that required motorization bolster. Since the ranchers are getting old, work making of youth was offered for labour exercises, for example, stacking agrarian contributions from their home to the fields.

5.2.7 Impact of MTT and CTT practices on economic status (labour force) of households in Samaria

The normal of Samaria MTT family unit estimate added up to 13 individuals for every family, and 4 individuals in the CTT members. The cultivating exercises in MTT hones were less than CTT automation. For example, showering and planting are the principle exercises led in the MTT cultivating, impossible, in CTT works on, furrowing, discing, planting and splashing are the primary exercises. This implies CTT activities require more work compel and furthermore costs. The discoveries demonstrate that 7% of MTT members regularly utilized family work in top circumstances for automation when contrasted with 2% of CTT members utilized as a part of Samaria. The examination additionally demonstrates that 6% of MTT members utilized procured workers for tasks while 2% of CTT members used contracted work for motorization purposes. The respondents detailed that they had bring down work costs in least culturing innovation because of less tasks that required motorization bolster. Since the ranchers are getting old, work formation of youth was offered for labour exercises, for example, stacking horticultural contributions from their home to the fields.

6. CONCLUSION AND RECOMMENDATIONS

The livelihood and lifestyle were changed because the poverty was reduced in these two study areas. The family and hired labour force were employed for mechanization operations. There was a creation of jobs during the introduction of minimum tillage technology governmental intervention program. Despite that, there was an increase of crop yield from farmer's fields, people in the study areas and neighbours were benefited through maize and beans donation As a rule it can along these lines reasoned that respondents in Lower Kroza (Ndwane) and Samaria

people group saw that the effect of least culturing innovation hones has enhanced in their family units from their cultivating endeavours (Maize ventures), particularly with respect to vocation and nature of strength of the general population in light of harvest yield, quality and manageable maize ventures. The last segment talked about the impact of the noteworthy indicator factors on the needy variable. It can be outlined that the agriculturist factors with a higher likelihood affected the family units to partake in least culturing innovation rehearses. Those factors included family unit age, sex, level of instruction and work constrain. That impact came about to a suitable thought which focused the little scale ranchers of Lower Kroza and Samaria people group to effectively take part in the base culturing innovation approach. On the cultivating factors, it has been discovered that the land residency framework and field crops are more imperative in affecting agriculturists to take an interest in the base culturing innovation venture advancement from least culturing innovation members.

The creatures were additionally in the chance of being sustained with maize and maize stalks from the base culturing innovation members' fields. In conclusion, yet not slightest, the effect on job family in the examination territories was likewise talked about which depended on financial prosperity, for example, trim yield, work compel, sustenance security, destitution decrease and soil fruitfulness. The change of financial prosperity affected family units in their basic leadership to participate on least culturing innovation rehearses. This pattern can advance full support of ranchers on the development presented by the Government of Eastern Cape Province (Agricultural Extension Advisors).

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Back to Table of Contents

PARADIGM SHIFT FOR FARMER DEVELOPMENT - SICINGIMISO COOPERATIVE A MODEL THAT HAVE POTENTIAL OF AMPLIFYING

THE IMPACT TO ECONOMIC GROWTH THROUGH SMALL HOLDER FARMING.

Nduku, B.[32]

ABSTRACT

Elliotdale town (315342S, 284110E) with approximately 133rural villages and a population of about 66,900, in 8,082 household's (Stats 2011) falls within Mbhashe Local Municipality; this municipality earned its name from the beautiful river called Mbhashe. Mbhashe LCM comprises of three small town (Elliotdale, Idutywa, and Willowvale). Ward 15 forms one of the nine wards of Elliotdale, although the villages situated from 10km to 60km away from Elliotdale town. These villages are predominantly rural, with high levels of unemployment and poverty. participation by farmers in sustainably agriculture in this ward is likely influenced by certain challenges, this study will look to some of the challenges faced by smallholder farmers (Sicingimiso) in their shift from Siyazondla to smallholder farmers also identify potential partners that have impact in developing rural farming communities. The introduction of Siyazondla by the department of Agriculture had shown a shift from producing maize only to a significant production of a variety of vegetables such as spinach, cabbage, carrot, beetroot and potatoes. Although however, the interest shown by the community members in farming is very promising.

Keywords: smallholder, Siyazondla, Sicingimiso

1. INTRODUCTION

Elliotdale town (315342S, 284110E) with approximately 133rural villages and a population of about 66,900, in 8,082 household's (Stats 2011) falls within Mbhashe Local Municipality; this municipality earned its name from the beautiful river called Mbhashe. Mbhashe LCM comprises of three small town (Elliotdale, Idutywa, and Willowvale). Ward 15 forms one of the nine wards of Elliotdale, although the villages are situated from 10km to 60km away from Elliotdale town. These villages are predominantly rural, with high levels of unemployment and poverty.

The ward consists of a good base of natural resources, in terms of arable lands, forests and ever-flowing river (Mbhashe river), which serves as basic sources of food, wood and drinking water for humans and for livestock. The farming system is mostly subsistence, with many farmers producing maize in most parts of the land. There are a quite number of cattle, sheep and goats, with some of the farmer having some high-quality animals suitable for commercial market.

The introduction of Siyazondla by the department of Agriculture had shown a shift from producing maize only to a significant production of a variety of vegetables such as spinach, cabbage, carrot, beetroot and potatoes. Although participation by farmers in sustainably agriculture in this ward is likely influenced by certain challenges, this study will look to some of the challenges faced by smallholder farmers (Sicingimiso) in their shift from Siyazondla to

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smallholder farmers also identify potential partners that have impact in developing rural farming communities. However, the interest shown by the community members in farming is very promising.

2. LITERATURE REVIEW

2.1 Smallholder agriculture and its impact on food security

Food security has a long history in South Africa (Hendriks, 2014). Its genesis can be found in the diverse livelihood strategies of indigenous communities before the advent of colonialism. In Southern Africa, the issue of food security has continued to give rise to increasing challenges over the last 20 years. Love et al. (2006) argue that it is not logical to resolve food-security problems by focusing on increasing the production of commercial farmers. Kirsten & Van Zyl (1998) argue that small-scale farming is not backward or non-productive, but can be as viable, profitable and efficient as large-scale farming. However, the South African government is faced with the tremendous tasks of reducing the number of barriers facing SHFs (Kirsten & Van Zyl, 1998). About three-million households in South Africa are engaged in subsistence agriculture (Aliber & Hart, 2009; Altman *et al*., 2010; Biénabe, Vermeulen & Bramley, 2011), while SHFs number about 250 000 farmers (Aliber & Hall, 2012). Both groups receive limited attention from policymakers (Altman *et al*., 2010). According to Baiphethi & Jacobs (2009), there is a significant need to increase the productivity of SHFs in order to ensure long-term food security, as smallholder production increases the food supply within households and therefore stifles the effect of commodity and food prices on these households while at the same time improving food security. A paradigm shift is required for the future of food and farming systems in Africa. A clean beak is needed away from a chemical approach to a biological approach; from a Green Revolution, to an agro ecological revolution; putting smallholder producers at the centre of food systems. Extensive evidence suggests agro ecological farming (Von Loeper *et.al*)

According to the research that was done in Limpopo Vhembe district (Baloyi 2010) which state that Producing for the market calls for production resources, including production means such as land, water, on-farm and off-farm infrastructure, labour force, capital, and good management of these resources. Poor access to these resources affects the way in which smallholder farmers can benefit from opportunities in agricultural markets, especially in terms of the volume of products traded and the quality and quantity of those products.

Based on the surveys employed for purposes of that study, the participation of smallholder farmers in high-value markets is constrained because of poor access to comprehensive agricultural support services. There are relatively few direct linkages between smallholder farmers and fresh produce markets, supermarkets, and agro processors.

The majority of sales by farmers are at either the local market or the farm gate level. Few farmers have access to basic production equipment and infrastructure. More attention must be given to supporting smallholder farmers in both districts to ensure that they engage in commercial production and participate in high-value markets on a sustainable basis. This could only happen if their constraints along the value chain are addressed (Baloyi 2010). The major challenge confronting policymakers is to create an enabling environment for smallholder farmers and empower them to produce high volumes of good-quality products on a consistent and

sustainable basis. A policy initiative to stimulate the paradigm change is required. This will lead to the redesign of support systems and the development of an understanding of stakeholders, including smallholder farmers, in the agricultural value chain. However, general constraints facing smallholder farmers in developing countries should be emphasised and acknowledged prior to the implementation of policies or programmes with the objective of promoting smallholder farmers. The Lewis model considered the subsistence agriculture sector as a labour pool and not a vehicle of development. With this worldview, little attention was given to agricultural development and particularly smallholder agriculture, and the primary focus of rural intervention was on community development that was largely on social welfare interventions (Barnettt, 1995). In particular, food security will be achieved when the poor and vulnerable, particularly women, children, and those living in marginal areas, have secure access to the food they need.

2.2 The impact of smallholder agriculture on ecosystems

Farmers need to move from a linear to a holistic approach in agricultural management, they should know that he/she is not only a producer of agricultural goods, but also a manager of an agro-ecological system that provides a quite a number of public goods and services (e.g. water, soil, lands, landscape) (United Nations)

3. SITUATION ANALYSIS

3.1. Demographic information.

The information was acquired through visiting and interviews with relevant community members.

3.1.1. Population

According to the community survey of 2011, the population of ward 15 was estimated at about 19500 households, with an average of 10-20 persons per household of which most of them are children (Stats 2011).

3.1.2 Employment, income and skills

Between 80 % and 90% of the people in this ward, live below the poverty line, earning less than R800.00 per month. Their main source of income is derived from old age pension, child and disability grants. A little percentage of women receives money from their husbands who are working in other provinces such as Gauteng, KwaZulu Natal and Western Cape. Some women receive income through vegetables by selling surplus produce. Some of young man and few older men get something by doing odd jobs around the community.

3.1.3 Labour force

It is important to note that the majority of active people are working outside the area, leaving behind woman, children and frail old man. A few young males are available and show interest, but the majority are not interested in agriculture. Woman have been proven to be the best labour force available, being involved in many household activities including preparing for kids,

cooking, cleaning, fetching firewood, fetching water from faraway streams, laundry, hand work, planting and irrigation.

Figure. 1: Activities performed by women.

3.1.4 Literacy

Most people in this ward are illiterate, with few matriculates. Those who are literate tend to look for greener pastures outside the area of Elliotdale. Most young males do not even finish matric, opting to look for jobs in other provinces. The introduction of training workshops and ABET will play a role in equipping the adult members with necessary skills.

3.1.5 Skills

People with relatively low skills populate this ward. The introduction of training workshops and ABET will play role in equipping the members with necessary skills. Through the introduction of projects, the members have benefitted from the training and workshops offered by agriculture and other sectors as shown in figure 2. These Training workshops have helped community members in improving their natural skills. Some of the skills include vegetable and poultry production, project management, livestock management

Figure. 2: The coaching offered by the extension officers also help in improving on the indigenous knowledge of the farmers.

3.1.6 Quality of life

Ward 15 is one of the poorest wards, which have little or no access to basic services. Roads are in bad condition and that lead to economic challenges experienced by the local dwellers as they became unable to reach out for basic services.

Table 1: Summary of the basic services available in this ward.

Access to basic services	**Source**
a) Drinking water	Rain water from tank and rivers
b) Irrigation water	Dams and rivers
c) Households energy source	Firewood, candles, solar, paraffin gas& electricity
d) Sanitation	Pit latrine and open veld

3.2. Food security projects

In order to ensure food security there is a need to extensively increase the productivity of smallholder agriculture, Baloyi 2010 argued that encouraging farmers to pursue sustainable rise of production could achieve this. Baloyi study also revealed that smallholder agriculture is the best option for addressing food security since agriculture is the best option for addressing food security since it is considered the main livelihood strategy for small-scale farmers. Increased commercialisation of smallholder farming can be a key in reducing rural poverty as well as stimulating rural economic development (DAFF 2012)

Siyazondla programme, Sicingimiso Cooperative, and Xuba maize project these are available food security projects in this area and are improving to be very effective in food security and poverty alleviation. At Xuba A/A there are seven groups of Siyazondla, each group consists of 15 members mostly women that are actively involved in producing vegetables in their backyards homestead garden.

From 2009, the department of agriculture has assisted these groups with garden inputs to encourage them in producing their own food. They also receive inputs from municipality through

LED intervention. This area is very promising in fruit production so many households do have fruit trees especially Citrus fruit. Recently ARC together with DRDAR have visited homesteads with fruit. They have promised to come back and give those members training on fruit production and post-harvest handling. The table below shows the Siyazondla group and DRDAR intervention

Table 2: Siyazondla groups reflect assistance by DRDAR.

Groups per area	DRDAR's intervention				
A/A	Number of groups	Water tanks	Seeds, spades, forks, hoes and wheel barrow	Orange trees	Seedlings and seeds
Xuba A/A	7	-	5 groups	4 groups	7 groups

Figure 3: Members of Sicingimiso Primary Agric co-op

4. METHODOLOGY

4.1 Problem statement

Food security needs paradigm shift, smallholder farmers have important role to play, extension officer has a responsibility to design extension programme that will help farmers.

The introduction of Siyazondla by the DRDAR shows a shift from producing maize only to a significant production of a variety of vegetables.

4.2 Significance of the paper

This study will help and be useful for policy makers of different stakeholders in their effort to promote shift from subsistence farming into smallholder farming. Sicingimiso cooperative has chosen to be studied based on their potential among members, and the significant role they already play in altering the lives of rural farmers in Ward 15. Paradigm for shift in Siyazondla into smallholder farmer Sicingimiso coop, this paper will also focus to challenges and achievements they encounter in their transition.

4.3 Objectives of the paper

- To identify potential partners that have impact in developing rural farming communities.
- Examine some of the challenges faced by smallholder farmers (Sicingimiso) in shift from subsistence to smallholder farming.

4.4 Data collection Method

Qualitative method of data collection applied. Information collected through visiting household participating in Siyazondla programme. Meetings with Siyazondla groups in ward 15 with specially emphasis to Xuba A/A. Community leaders used as the initial contact people when visiting households. For primary data collection, one farmer per each group interviewed, with particular reference to Sicingimiso coop. Special visit to the local chief paid on regular basis.

5. RESULTS AND DISCUSSION

Results was analysed with particular reference to literature review and data collection. One of the significant challenges faced by farmers is lack of information. Extension officer with other officials from department have manage to arrange farmers day and information sharing sessions and invite other institution such as Mpofu Training Centre, ARC, Umtiza farmers coop, SEDA, LED, etc. to come and hold presentation on the basis of services they can offer farmers and make follow up visit after. Dependency on social grant is also a major problem; Sinyolo S. et al 2017, in his study that he conducted in KZN has also prove that.

Table 3: Summary of achievements

Year	Achievements
2008	Introduction of Siyazondla in this area has shown a great shift to producing maize only into producing variety of vegetable. Formed groups consists mainly of women with 15 members. About 7 groups formed in Xuba A/A, they use their backyard gardens for vegetable production
2009	Expand from vegetable production and include Broiler chicken production due to DRDAR intervention
2010	Applied for cooperative certificate through DRLR intervention
2012	Four groups registered as cooperative and Sicingimiso was one of them
2013	The other three cooperative became inactive, due to challenges, they had but Sicingimiso manage to pull out. Sicingimiso with 13 active members continue to use their back yard garden, and each member contribute R50 per month to raise funds.

2014	They receive assisted from DRLR through an agent TEBA LIMA. They have partnership with Maize producer (Xuba)
2016	This cooperative serves to be an inspiration to other women around the community, continue to support community with fresh vegetable and six weeks old chicks.

6. CONCLUSION

It is clear that Ward 15 display good potential for growth in Agriculture. Sicingimiso cooperative members are working so hard in order to improve their live hood. The assistance in many forms provides positive rewards. The supply of appropriate support services could alleviate these constraints as suggested in the table below, allowing more efficient utilisation of agricultural resources and increasing the opportunities for smallholder farmers to supply agricultural markets. According to literature review and survey, conducted dependency on social grant is a problem and commercialization of smallholder farming can act as a key in reducing rural poverty while stimulating rural economic development.

Table 4: Some recommendations for improving agricultural production in Ward 15

Recommendation	**Impact on society**
Fencing of arable lands	Increased interest in crop production (throughout the year) due reduced damage by livestock
Fencing of grazing camps	Improved livestock management and breed improvement.
Clearing and renovation of dams	Increased water holdings capacity during rainy seasons. Reduce livestock death and adequate water for irrigating winter vegetables. Resulting in adequate crops for production and also improve Siyazondla homestead gardens
Erection of a shearing shed	Improved wool production and income for farmers

Construction of water mini-reserves	Easy access to clean water, healthy labour force for performing other activities.
Maintenance of access roads	Easy access to basic service
Training skills and funding	Can help improve sustainability of primary agricultural cooperatives.

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Back to Table of Contents

THE ROLE OF MENTORS IN LAND REFORM PROJECTS SUPPORTED THROUGH RECAPITALISATION AND DEVELOPMENT PROGRAMME: FINDINGS FROM BUFFALO CITY METROPOLITAN MUNICIPALITY, EASTERN CAPE, SOUTH AFRICA.

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ABSTRACT

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There have been several laws and policy shifts since the inception of land reform in South Africa. In the midst of policy shifts, the Recapitalisation and Development Programme (RADP) was launched by the Department of Rural Development and Land Reform in 2010 to assist farms that have received little or no support. The RADP also links recipient farmers with strategic partners or mentors. Mentors and strategic partners believe that their role is to guide the beneficiaries to grow and become independent farmers. Qualitative research was conducted in the form of seven in-depth case studies of RADP-supported land reform projects, together with interviews with four RADP mentors and three government officials. Some of the challenges in the farms before RADP funding was received included: little or no income, high mortality rate of livestock, and lack of skills. The study revealed that the RADP funds contribute to making a difference to the beneficiaries' activities and provide the necessary infrastructure and equipment for sustainable commercial production.

1. INTRODUCTION

1.1 Background

Jacobs, Lahiff & Hall (2003) state that land dispossession during the colonial era and the decades of apartheid rule produced a highly unequal pattern of land ownership and widespread rural poverty in South Africa. According to Buys (2012), from the time that settlers arrived in South Africa black people faced increasing landlessness, poverty, and insecurity on the land due to racial laws.

However, according to Hall & Kepe (2017), after 23 years of democracy South Africa's land reform is in flux. There have been several laws and policy shifts since the inception of land reform in South Africa. In the midst of policy shifts, the Recapitalisation and Development Programme (RADP) was launched by the Department of Rural Development and Land Reform in 2010 to assist farms that have received little or no support. The RADP also links recipient farmers with strategic partners or mentors.

According to McLennan & Troutbeck (2002), strategic partnerships offer a significant opportunity to improve an organisation's business prospects, while according to Terblanché (2011), mentors use their experience to provide skills and knowledge through guidance, counselling and coaching. Murray (1991), as cited by Terblanché (2011), defines mentorship as a structure and series of processes designed to create effective mentoring relationships, guide the desired behaviour change of those involved, and evaluate the results for the protégés, the mentors and the organisation with the primary purpose of systematically developing the skills and leadership abilities of the less experienced members of the organisation. Mentorship according to this definition can be different from profession to profession and according to the workplace practices where it is implemented (Terblanché, 2011). On the other hand, strategic partnership is a relationship between two commercial enterprises and which is usually formalized by one or more business contracts.

According to Skwatsha (2016), there are currently 651 strategic partnerships secured through the RADP to provide technical, financial and infrastructural support to the beneficiaries. According to DRDLR (2013), some enterprises or projects may not require a partnership or mentoring but may qualify for direct support if they illustrate sustainable financial and enterprise development.

For instance, from the table above, one can see that for the Eastern Cape, up to March 2014, 103 of the 188 RADP projects did not involve partnerships with mentors or strategic partners.

These projects are rather assigned project managers from the Directorate: Rural Enterprise and Industry Development (REID), who take the responsibility for the monitoring of these enterprises. From 2015 REID recruited agricultural graduates to assist the land reform projects in the country that do not need partnerships but more technical assistance for day-today operations.

These agricultural graduates' roles include implementing and monitoring achievements of the project output, reporting timeously and authentically to government, communicating challenges and proposing solutions, providing beneficiaries with skills to be competent producers, advising government on project budget requirements based on the business plan, disbursing funds in accordance to disbursement procedures, assisting beneficiaries in planning to service their loans, and managing the farm inputs, equipment and management services procurement process.

Mentors and strategic partners believe that their role is to guide the beneficiaries to grow and become independent farmers, which is important especially because beneficiaries do not have the necessary knowledge and would not be able to manage the RADP funds (DPME, 2013). Strategic partners/mentors identify the following as their roles and responsibilities: implementation of RADP according to business plans, capital investment through contribution of own resources, linking farmers to markets, provide access to commercial best practices (technology transfer), empower beneficiaries through technical skills transfer, monitor expenditure according to business plans and ensure sustainability of the farms.

According to DPME (2013), the poor selection and supervision of strategic partners is one of the factors that contribute to the poor performance of farmers in RADP projects as shown by recent evaluation. In some provinces the beneficiaries in these strategic partnership projects as compared to those that have mentors lack control over land, capital and production (Hall & Kepe, 2017). The review by DPME (2013) indicates that the role and satisfactory rate of strategic partners and mentors differs from province to province regarding technical and managerial skills transfer.

1.2 Appointment of mentors

According to the key informants interviewed for the study there were different strategies to advertise the mentorship programme. They were called to a meeting through their farming associations, contacted through the department's database, advertised through local newspapers, etc.

Upon appointment of mentors, both the mentor and the beneficiary need to sign legal contracts, such as "RADP grant and skills development schedule of standard terms and conditions: mentorship agreement". According to section 3.1 of the mentorship agreement, the following are considered before it becomes effective;

…3.1. The Agreement becomes effective on the date specified in the Acceptance Letter, but the obligations and rights that arise from this agreement are wholly suspended until the following conditions are fulfilled to the satisfaction of the Department:
3.1.1. The Department has formally approved the Development Grant in terms of the Department's policies and delegations of authority and in accordance with the approved Business Plan as evidenced in the Acceptance Letter;
3.1.2. The Implementation Plan has been developed and approved in terms of the Policy and the Department's delegations of authority;
3.1.3. The Grant Recipient has appointed an Accountant for the Project and the Accountant has provided the letter of undertaking to the Department in the prescribed format;
3.1.4. The Grant Recipient has provided a certificate co-signed by the Accountant, confirming that effective, efficient and transparent financial management and internal control systems will be implemented in accordance with the provisions of the Public Finance Management Act, 1 of 1999; and
3.1.5. Where the Farm is owned by the Grant Recipient, a notarial deed granting a right of first refusal to the benefit of the Department has been properly registered…

2. AIM OF THE STUDY

The main aim of this paper is to assess the role of strategic partners and mentors in capacitating beneficiaries with skills and knowledge.

3. METHODOLOGY

The study employed a qualitative approach. It was used to gain a clear understanding of in-depth motivation of RADP. The target population of the study was LRAD and PLAS land reform beneficiaries in BCMM who also benefited from the Recapitalisation and Development Programme. In BCMM, there are 18 LRAD and PLAS projects that have received support from the RADP, encompassing about 61 total beneficiaries. Of these, seven projects were selected for in-depth study, accounting for about 31 beneficiaries. The researcher conducted in-depth personal interviews using an interview guide comprising largely open-ended questions. In-depth case studies and the key informants' perspectives provided the data which were qualitatively analysed using thematic analysis and data from some sections on the questionnaires/interview guide were encoded and analysed using Microsoft Excel to get percentages and draw graphs.

4. RESULTS

The main aim for mentors and strategic partners is to enhance farmers' skills and as mentioned and emphasised in the RADP grant and skills development schedule of standard terms and conditions. According to the mentorship agreement, "*the Mentor shall continuously assess the skills of the Grant Recipient and shall accordingly mentor, train and develop the skills of the Grant Recipient in order to enhance the Grant Recipient's proficiency as a commercial farmer."*

For one to be considered a competent mentor, s/he has to at least be willing to help at all times, be up to date with current and changing technology and knowledge, have effective leadership and managerial skills, and be an active listener.

4.1 Beneficiaries' point of view

The researcher wanted to know the role of mentors as seen or as experienced by the farmers/beneficiaries. According to all beneficiaries, they required mentors in order to receive RADP funds. However, the role of mentors as perceived by beneficiaries was not only to get access to funding but to transfer skills and knowledge, provide training on lacking skills, facilitate access to markets, assist with farm and business management skills.

Beneficiaries from four projects were satisfied with the role of mentors and mentioned that they wish they would extend the mentors' contracts, but funds would not allow them. However, beneficiaries from three projects were not satisfied.

The beneficiaries who were satisfied with their mentors mentioned that their farming skills improved. They mention that before the appointment of the mentor, their farming lives were difficult since they were not well equipped with advanced farming strategies and techniques.

One beneficiary mentioned:

> "As old people the mentorship programme has assisted us a lot. Times are changing so we also need to be equipped with new technology"

Another one echoed:

> "*Before our mentor arrived, I did not know how to plant cash crops because we focused mostly on livestock production. I am happy and confident now because I gained more knowledge on planting of crops and application of fertilisers."*

The respondents showed a lot of appreciation on the mentorship programme and how it impacted their lives as well as the good relations they had built with the mentors.

One respondent mentioned:

> *"We still wish the contract between the mentor and the Department existed for such longer period than a year. We feel there is a lot we still need to learn from him."*

Another beneficiary said:

> *"I appreciated the guidance from the mentor as the farming venture was healthy; we still call each other even today. I share my plans with him for his advises. I appreciate the experience and training I have received through my mentor"*

The beneficiaries who were unsatisfied with their mentors felt having a mentor wasted their time.

One beneficiary said:

> *"Having a mentor was a waste of money and my time, it seemed like one wanted to prove to the other who knows best."*

Beneficiaries indicated that according to them a mentor should not behave like a boss, rather a person who is there to assist. In this regard the beneficiary said:

"My mentor lived far from my farm, he would come fortnightly or even once a month and expect us to run around and accept everything he tells us to do"

Another beneficiary said:

"I do not even think these mentors understand their role as mentors to these farms. Sometimes they do not comply to the scheduled visits and mentoring sessions"

4.2 Perceptions of mentors

4.2.1 Mentorship experience

All mentors interviewed indicated that their highest level of education is the tertiary level. All mentors mentioned that they are farmers themselves which gives them a good opportunity to share with the beneficiaries what they also have encountered or still face in the farming industry. Three of four mentors mentioned that they have qualifications in Agricultural Extension, which they all agreed has assisted them in creating a smooth and good relationship amongst themselves and the beneficiaries.

One mentor stated:

"Agricultural extension is very broad and it starts from understanding a person before you can even share information with them so that you can know how to behave around that person."

Another mentor mentioned that:

"Some of the most important skills and techniques recognised and observed by those with extension knowledge is S*ituation Analysis and acknowledgement of Indigenous Knowledge. These help you to share correct skills according to the needs of people at the same time acknowledging what the beneficiaries already know."*

4.2.2 Field of specialization

Mentors specialised in different fields and commodities of agriculture, however, it was mentioned that their specialities as mentors depend on the farmers' business interests. Commodities mentioned by the mentors included beef, dairy, poultry, pig, grain and vegetable production.

Even though the mentors mentioned their field of specialisation, they also mentioned characteristics that are needed for one to be considered a good mentor.

One mentor expressed his views on the characteristics of a mentor as reflected in this quote:

A mentor must be able to get along with other people with good commended track record that is traceable. S/he must be able to identify fears and misunderstandings with their mentees and identify perceptions that could hamper progress in the farm.

Another one said:

"A good mentor shall be able to establish expectations from both mentor and mentee and also agree on realistic goals that will improve production."

4.2.3. Involvement in land reform projects as mentors

Two mentors mentioned that they were already in the department's database because of the previous programmes they worked together with the department on. The other two mentors indicated that they were approached by the beneficiaries since they know them. All four mentors interviewed mentioned that they have only mentored one land reform project each and one mentioned that he has mentored two farms for two years.

4.2.4 Mentorship contract/term of mentorship

According to the RADP funding model as proposed by the DRDLR, the departments' contribution to the farm decreases as years continue and it is expected that the mentor's contribution or involvement continue up to five years. However, all the mentors mentioned that their contracts for each project were 1 year. This raised an alarming follow up question on the ideal time of mentorship.

All mentors mentioned that the ideal time for mentorship is between 5 to 10 years.
One mentor said:

> *"You cannot expect a farmer learn all the necessary skills within a year unless you want them to fail."*

Another one mentioned that:

> *"The beneficiary and I went back and forth for the whole year trying to adjust and fix the business plan as we wanted to make it an operational plan, it was pity that as the contract ended there was not much done to that farm as he acquired it with nothing but only an old house"*

4.2.5 Skills shared

All mentors indicated that time given to mentor is not sufficient to capacitate the farmers with all the necessary skills to successfully run a productive farm, however, they mentioned that they try by all means to share all the important skills within that short period of time. The skills that mentors state they try to share with beneficiaries include the following: business management skills, organisational skills, people skills, health awareness, technical knowledge, communication skills, time management, and farm management. Mentors emphasised that before skills are transferred and trainings are conducted there should be establishment of trust relationship between mentor and mentee.

4.2.6 Problems encountered

The problems as mentioned by the mentors included the following:

> **'Love affairs'** – The beneficiaries' tend to romantically involve themselves to other members of the same group or project. This is seen as detrimental to the project as romantic relationships cause complications and minor conflicts that could have been avoided if such relationships did not exist. One mentor mentioned that: *"These*

relationships are able to change the way of thinking, approach, and behaviour which affects their professional life and in most cases their performance as a group decrease."

Lack of agricultural knowledge - Mentors mention that some of the beneficiaries have little knowledge on agriculture. This is difficult for the mentor to remedy given how brief their mentorship contracts usually are only for a year.

Government officials' understanding of agriculture – One mentor indicated that some officials from the Department do not understand agriculture so when they take decisions, they do not consider all aspects as an agriculturalist would. He further said, *"Some of the officials when they visit the farm would come in suits and heeled shoes".*

Recap funds – There are two main issues that are alarming to the mentors, the issue of the gap in time between tranches, and beneficiaries requesting and buying unnecessary items. Mentors mention that the time the beneficiaries have to wait between tranches delays the process of production. Some beneficiaries insist on buying items that are not urgent in improving the production. The researcher also observed that on one of the farms, the beneficiaries started by building office spaces and buying office materials before they were even operational.

One mentor said:

"*A farm is not a guesthouse or a hotel, it is a place to work. It is saddening to see that beneficiaries want to spend all their recap funds in renovating their farm houses and turn them into luxury houses and the Department entertains that. Money should be invested in what will bring returns".*

5. CONCLUSION

Mentorship remains a vital practice to be considered in capacitating land reform beneficiaries' according to their needs and skills, such as farm and/or business management, technical knowledge, etc. According to the mentors interviewed, a mentor should be someone who at heart is eager to transform beneficiaries to be better farmers and perform better, someone who has an up-to-date knowledge of agricultural technology and skills. Beneficiaries also need to promote a healthy relationship between themselves and the mentors by availing themselves and being willing to learn and cooperate. Most beneficiaries' who appreciated mentorship programme seem to be old people. Less participation of youth to agricultural activities raises an issue on the sustainability of the projects given that the mentors are only given a single year to work with the beneficiaries. The general expression from the beneficiaries regarding RADP funding and mentorship programme, clearly exposes that the programmes has the potential to reduce unemployment. Even though there were mostly positive responses from the beneficiaries, however some were unsatisfied with their mentors. They were concerned by the non-effectiveness of mentors in their lives because some mentors do not understand their roles and responsibilities. It is recommended that the funds should be made available for strategic partners and/or mentors to have an agreement of at least three to five years in a single project.

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Back to Table of Contents

SCAVENGING CHICKEN PRODUCTION MODEL FOR RURAL POVERTY REDUCTION IN THE EASTERN CAPE PROVINCE: A THEORETICAL DESIGN FOR VILLAGE SYSTEM.

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ABSTRACT

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Models of scavenging chicken production have been used in some parts of the world to address pervasive poverty common to the resource poor, with some significant achievements. The study focused on the design of a scavenging chicken production model (IPPM) for farmers in the Eastern Cape Province (ECP), South Africa. The study draws on the working modalities of the Bangladesh Poultry Model, the Rakai Model in Uganda, The Tanzania Research Into Use (RIU) model, Bariadi and the Benin Models. The development of the conceptual framework was based on the concepts of an "open social system" that are based on productivity, efficiency, stability, durability, compatibility and equity. A theoretical model IPPM was developed with components that include: the scavenging chicken farmers' cooperative society, the breeders and hatcheries, veterinary services, feed mills, capacity development, chicken processing plants, and marketing. The model was based on the principles of member-driven, member-controlled and member-responsive organization, which shall be run as a transparent, accountable, and respect for the core values of the organization emanating from the model. The model sought to create strong linkages with all the stakeholders in the scavenging chicken production industry. The interface will create a forum for support to members through capacity training, credit facilities and input support. A catalytic mechanism is envisaged that will promote cohesion due to the willingness / interest factor embedded rather than persuasion for membership approach. The model aims to provide core values to the members through value chain components, cooperative society management and food security.

Keywords: Farmer's cooperative society, Scavenging chicken farmers, Open social system, poultry models,

1. INTRODUCTION

The use of scavenging chicken or family poultry to address poverty has been well documented. The initiative started in Bangladesh in the early 70s (Sonaiya, 1992) and has spread to some part of the world that include Uganda, Benin Republic, Nigeria, Togo, Tanzania, Burkina Faso, Ghana and Botswana with success stories. Unfortunately, the initiative has not been used in South Africa (SA) to address the pervasive poverty. Most of the programs of the government have focused on other livestock that include cattle, sheep, goat, pigs and exotic poultry. Even with the extensive systems of scavenging chicken prevalent in the rural South Africa where the majority of the vulnerable reside (Fort Hare Institute for Social and Economic Research [FHISER], 2010: 10), the initiative has not been given policy considerations. As a result, the scavenging chicken industry remains an untapped potential economic source.

This study thus, analysed the agricultural growth options that can support the formation of a more comprehensive rural development component using scavenging chicken production (SCP) model. In particular, the study sought to reposition the rural economy landscape, with a sustainable agricultural enterprise through willingness to contribute and own the cooperative society as an independent agricultural enterprise. For this purpose, as well as to assist the policy makers and other players in making informed decisions, a conceptualized SCP model for the rural Eastern Cape Province (ECP) was developed. The study drew on the working modalities, strengths and weaknesses of several successful SCP models used elsewhere, namely the Bangladesh Poultry Model (BPM), Rakai in Uganda, the Research Into Use (RIU) in Tanzania,

the Benin Model and the *Projet pour le Développement d'Aviculture Villageois* (PDAV) model, Burkina Faso.

1.1 Methodology

Developing a model is usually a response to new realities and emerging opportunities. As a result, there is no one size-fits-all model. The prevailing situation in an environment usually dictates how and in what forms a model is shaped or designed. According to Shafique & Mahmood (2010), model development is an effective research method that provides the essential ingredients in designing new systems or services. Indicators of good models are productivity, efficiency, stability, durability, compatibility and equity (Mandal, Khandekar, Singh & Khandekar, 2005:876).

1.2 Research design

The study used the concept of "Open System Theory" (OST). The OST conceives an organization as a combination of parts with interdependent relationships and open to interactions with the external environment (Hanson, 1996; Hanna, 2000). According to Thien & Nordin (2012), the external environment is regarded as government regulations, socio-cultural, economic and political forces that influence the operation of the OST.

The open system model is composed of the environmental conditions (physical, social, economic, cultural) and the organizational sources of resources. Within the two compartments are:

a) Non-members residents where membership is derived (willing membership);
b) The resources- the technical skills, attitudes and beliefs that are common to the members;
c) The organizational structure- this is the structure upon which the organization will be created and the functions;
d) The organizational climate: The sense of cohesion, task focus and the leadership control of the organization;
e) Internal resources: The attitudinal and behavioural tendencies of members.
f) Outputs: The maintenance as entity in the community and sponsorship of activities around programs and projects (Figure 1).

Figure 1
An Open Systems Model of the Organization

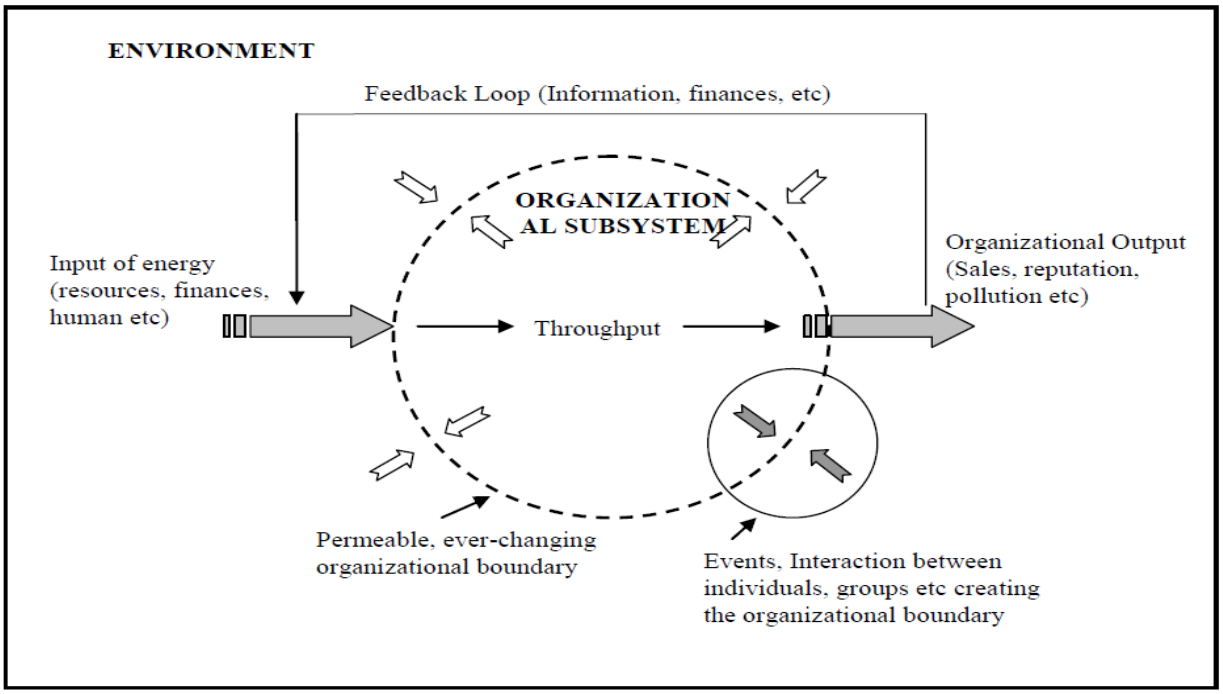


Figure 1: The Open Systems Model. Adapted from Daniel Katz and Robert Kahn 1978

Katz & Kahn (1978) viewed organizations as open social systems with specialized and interdependent subsystems and processes of communication, feedback, and management linking the subsystems. The authors identified nine characteristics of open systems as follow:

1. Importation of energy from the environment (resources, people, etc.)
2. Throughput (transform resources available to them).
3. Output (export some resources to the environment).
4. Systems as cycles of events
5. Negative entropy (through input of energy/resources)
6. Information input, negative feedback, and a coding process. (to maintain steady state).
7. The steady state and dynamic homeostasis (and a tendency toward growth to ensure survival).
8. Differentiation and specialization.
9. Integration and coordination

2. REVIEW OF SOME SCAVENGING CHICKEN MODELS AROUND THE WORLD

2.1 Bangladesh Poultry Model

The Bangladesh Rural Advancement Committee (BRAC) in partnership with the Department of Livestock Services (DLS) developed the Bangladesh Poultry Model (BPM) for poverty alleviation through a series of field trials. The BPM consists of a supply chain of seven types of enterprises –breeders, mini hatchery, the chick rearers, the key rearers, the poultry workers, the feed sellers and the egg collectors (Islam & Jabbar, 2005).

Table 1: The Bangladesh Poultry Model

Production	Supply	Service
Breeders	Parent stock	Village groups
Hatcheries	Feed	Training
Chicken rearers	Vaccine/ medicine	Credit/ saving
Smallholders	Marketing	Extension

Source: Jensen & Dolberg (2003)

The technical features that facilitated the active participations of resource-poor women in the program according to Permin, *et al*. (2000) include; no start up assets; indigenous knowledge was valued; local inputs; community group and market linkage that focused on the village and local markets.

The model according to Permin *et al*. (2000) achieved significantly by creating social awareness for the women, improve nutritional status of households; promote economic empowerment of women and create massive employment amongst others.

The BRAC model, according to Dolberg, Mallorie & Brett (2002), was identified as having significant development potential because its establishment was rural based, required low levels of skills and capital to start, had potential for high returns on investment, enabled the consumption of chicken products, which improved the diet, involved women, who also made room for other tasks, had cultural acceptability and enterprise in which women were be able to retain ownership and control of the production process and the output arising there from.

2.2 The Rakai Model

The Rakai model was developed in Uganda by the Indigenous Consultants Researchers and Trainers (INCORET) (Ssalongo, 2003). The model synchronized hatching by a selective breeding program of local hens to produce large numbers of day-old chicks of exactly the same age (Roothaert, Ssalongo & Fulgensio, 2011: 223). The technology created effective vaccination program; local hatching technology; effective brooding and feeding management; improved hatching periods from two to seven times per year; simple, affordable and sustainable technology (Roothaert et al. 2011).

2.3 The Benin model

The semi-scavenging poultry model of Benin (Chrysostome, Riise & Permin, 2002:15) is organized around three pillars, which are: the production, the service and the supply pillar. Two national), the and were involved. The technical development of a chicken production system at the village level was handled by APRECTECTRA while the financing of the production inputs, group formation, credit training and follow up was by GRAPAD. Both were non-governmental organizations (NGOs). A strong foundation was established with the locals that included private veterinarians, craftsmen for the supply of locally made poultry keeping equipment, personnel of the "*Direction d'élevage*" for technical support; and of scientists of the *Faculté des Sciences*

Agronomiques of Abomey Calavi University and the Network for Smallholder Poultry Development in Denmark for the specific support in research and for the development of the system (Chrysostome *et al.,* 2002). Each pillar has specific functions and tasks within the model.

2.3.1 Achievement

The model caused high reduction in mortality of chicks from 90-100% to 5-10% after vaccination campaigns. There was rapid adoption of the technologies, use of local feedstuffs, group marketing at village level and sustainability effect.

2.4 The Tanzania Research Into Use (RIU) model

The Research Into Use (RIU) (a NGO) created an enabling environment for the commercialization of the scavenging chicken production. The modality used involved the mobilization of champions (female or male leader of a group of scavenging chicken farmer) who were empowered to raise 100 birds each, with a future planned increase of 200 to 300.

The RIU skills strategy enhancement was holistic and involved all the value chain activities. The first strategy was to identify the typology of stakeholders that were made up of the farmers, input suppliers, extension agents, live chicken traders, business advisory services providers, local government authorities, and regulators.

the RIU (2012) mapped out training for the farmers in their own environment. A novel idea of using livestock production certificate holders as "household caretakers" was introduced. Their duty was to stay with the farmers for the first 30 days, putting them through all stages of managing day old chicks for the first 30 days before the government extension workers would take over. The training revolved round feeding, health care with a poultry keeping guide book, vaccination calendar, and record keeping with all necessary documentation materials provided for the farmers. As results of this approach, RIU was able to achieve significant success within two years of starting the project. For example, networks of more than 500 farmers keeping between 100- 300 chickens were made available for the market every 3 to 4 months. In total these farmers were providing about 50,000 mature chickens ready for consumption every month. Contract farming assured farmer's ability to purchase inputs including chicks, drugs, vaccines, feeds and extension services.

2.4.1 Impact of the RIU

The impact of the RIU model could be summarized from the testimony of one of the champions of the project thus ''I want this story to encourage the host and other non-state actors to realize that small scale farmers are not born or made for poverty, because this is not true, …what we need is the right approach to educate and empower us and we will slowly transform our conditions ourselves'' (Mkongea, Poultry farmer and District Champion, Rufiji District Tanzania (RIU, 2011:25).

2.5 *Projet pour le Développement d'Aviculture Villageois* (PDAV) in Burkina Faso

The poultry model *Projet pour le Développement Aviculture Villageois* (PDAV) in Burkina Faso, was funded by *Coopération Francaise* (Sonaiya, 2007:9). The model has broad objectives to improve the hygiene, housing and feeding of family poultry (guinea fowl) and the transport and marketing of poultry products (Ouandaogo, 1990:31). The model employed a massive training program. The training strategies of the PDAV included: awareness campaigns for the program; publicity campaigns that target the resource poor farmers and rural dwellers in the villages; debates in schools; pamphlet distribution; village meetings; VVV meetings; training and retraining of the VVV; farmers' visits to livestock centres and technical conferences of livestock agents (Sonaiya, 2007:10). One of the major factors of success of the PDAV (Sonaiya (1992) was the strong political will of the government coupled with the high level of commitment to the development of the rural areas using agriculture.

Summary of important issues

From the review of some of the models, the following factors were identified that contributed towards developing the scavenging chicken production model; the chicken enterprise were grouped into three comprising of production, supply and services. The indigenous knowledge was incorporated into the model; local inputs; group marketing that focussed on the local and village markets; low capital start up; high returns on investment; improve household nutrition; effective use of vaccines; local hatching technology; effective brooding and feeding management; high rate of technology adoption; record keeping and improved housing.

3. A CONCEPTUAL SCAVENGING CHICKEN PRODUCTION MODEL (SCPM) FOR THE EASTERN CAPE PROVINCE (ECP)

In the design of the model, five basic elements were considered, and these are: inputs, a transformation process, outputs, feedback, and the environment.

a) **The inputs:** are the human resources, financial resources, physical resources and information resources;
b) **Transformation process**: this is the internal operation of the organization and its system of operational management (Lunenburg, 2010:3). The components include technical competence, a business plan, and ability to cope with changes;
c) **Outputs:** the rate of adoption of the technologies that is represented by the increase in the number of chickens kept by the farmers, improved housing, improved health care, a vaccination program, access to a market, healthy loan repayment behaviour, quality assurance, and brand name acceptance. The output will translate into an improved livelihood for the scavenging chicken production farmers and improvement in the rural economy;
d) d. **Feedback:** This is the process in which part of the output of a system is returned to its input in order to regulate its further output. Feedback will be from the extension services or the Non-Governmental Organizations (NGOs), the scavenging chicken farmers and the public on the product(s) of the organization;
e) e. **Environment:** The environment in which the organization operates impacts on its activities and this will be directed towards sustainability. According to Lunenburg (2010:4), the environment in which an organization operates is usually affected by the social, political and the economic contexts at various levels of governance.

3.1 The goal and guiding principles of the model

To promote sustainability economic empowerment for the uplifting of the resource poor, and creating an improving rural livelihood through scavenging chicken production, some guiding principles were proposed:

a) The concept of voluntary / interested person participation rather than a 'project' meant for all;
b) The fulfilment of entry requirements from individuals, in term of simple assets, will be promoted. This is to allow for serious minded participants to join the society that will be under the umbrella of a Scavenging Chicken Farmers Cooperative Society (SCFsCoop) otherwise to be known as *Abafuyi Benkukhu Zemveli* (ABZ);

In order to create a very strong synergy, members that form a village ABZ Co-op are expected to work as a team. In addition, the following must happen:

I. The equity trust shall be based on individual contributions, which shall be the bases of profit and loss sharing formula for the SCFsCoop;
II. The appointment of ABZ Co-op executive committee by the majority through selection or election. The appointed committee requires mentoring abilities, resourcefulness, and charisma;
III. The ABZ Co-op will be self-sustaining by generating its own capital base through shareholding subscriptions by members;

3.2 Capacity development

To achieve the objectives of the ABZ Co-op, for all the members as a group, capacity development will be by institutional support, University Community Engagement, or Non-Governmental Organizations (NGOs), in the following skills as identified by Terblanché (2008),

a) Technical skills;
b) Communication skills;
c) Group facilitation skills;
d) Extension management skills.

3.3 Components of the SCPM

The following shall constitute the components of the SCPM upon which the cooperative shall revolve round (Figure 2):

1. The ABZ Co-op;
2. The SCFs;
3. The Breeders and Hatcheries;
4. The Veterinary services;
5. The Feed mills;
6. The SCF rearers;
7. Capacity development;
8. A chicken processing plant;
9. Marketing.

3.3.1 The ABZ Co-op

The ABZ Co-op shall be the umbrella body for any member willing to be part of the cooperative. A member must register as an SCF residing in the village or a nearby village not more than 2km away. This is to facilitate an assemblage of members for training and regular meetings. The office of the ABZ Co-op shall be located in a central place, with a training center and an office.

3.3.2 Scavenging chicken Farmers (SCFs)

Criteria for membership

a. Member must be identified as poorly resourced farmer either male or female;
b. Own at least two hens with or without cockerel;
c. Be able to make a daily contribution of R2 minimum or R15/ week minimum to the ABZ Co-op to be entered into his or her account as equity contribution or holding;
d. Have a simple housing unit that can accommodate 20 birds with space for future expansion of up to 200 chickens;
e. Have compulsory three-week training program that will revolve round the management of SC.

3.3.3 The breeders and hatcheries

The model will promote some members to be breeders. The criterion for promotion will be to have had a large flock under his or her management in the last five years with a good track record of hygiene, resourcefulness and modest financial base. Such an identified member shall be given institutional support in the form of improved breeds of foundation stock at a subsidized rate. The breeder will be supplied with either eggs or day-old-chicks by the supporting institution. The supporting institution will partner with Fowls for Africa, a registered trademark with the Agricultural Research Council (ARC) for the supply of DOCs and eggs for hatching by the breeders.

3.3.4 The veterinary services

Amongst the team of the farmers shall be trained village vaccinators (VV).

3.3.5 The feed mills

An Agro-allied Company will be established for the supply of feed for the various categories of chicken production. Meanwhile, a program for the establishment of Scavenge Feed Resource Base (SFRB) along with a “plant protein bank” garden for the chickens to peck will form part of the core value of the feeding sector. The challenge of winter poor scavenging feeds will be addressed through the development of compost for insect growing.

3.3.6 The SCF rearers

The SCF rearers will be divided into two groups. Members will determine which area of interests he / she will like to venture into. The first group will be farmers brooding day old chicks for up to eight weeks. They will sell off the brooded chicks to the farmer growers.

The second group of the farmers will be the growers who will buy the chicks at eight weeks old and raise them till slaughter age. They will sell directly to the ABZ Co-op processing plant.

3.3.7 Capacity development

The University Community Engagement and Agricultural Research Council will undertake the capacity development of the SCFs in conjunction with the department of rural development and agrarian reform. The capacity development area will focus on all components of the scavenging chicken production value chain.

3.3.8 Chicken processing plant

In an attempt to exploit all the value chains within scavenging chicken production, small-scale chicken processing plants will be established. The supporting institutions will be encouraged to support them as part of developing the local economy and community empowerment. The processing plant will have the following components: a slaughtering slab, processing, packaging and cold store, and quality assurance.

3.3.9 Marketing

The ABZ Co-op shall be responsible for the marketing of the members' products via marketing channels to both the wholesalers and retailers.

4. SUCCESS AND SUSTAINABILITY INDICATORS OF THE SCPM

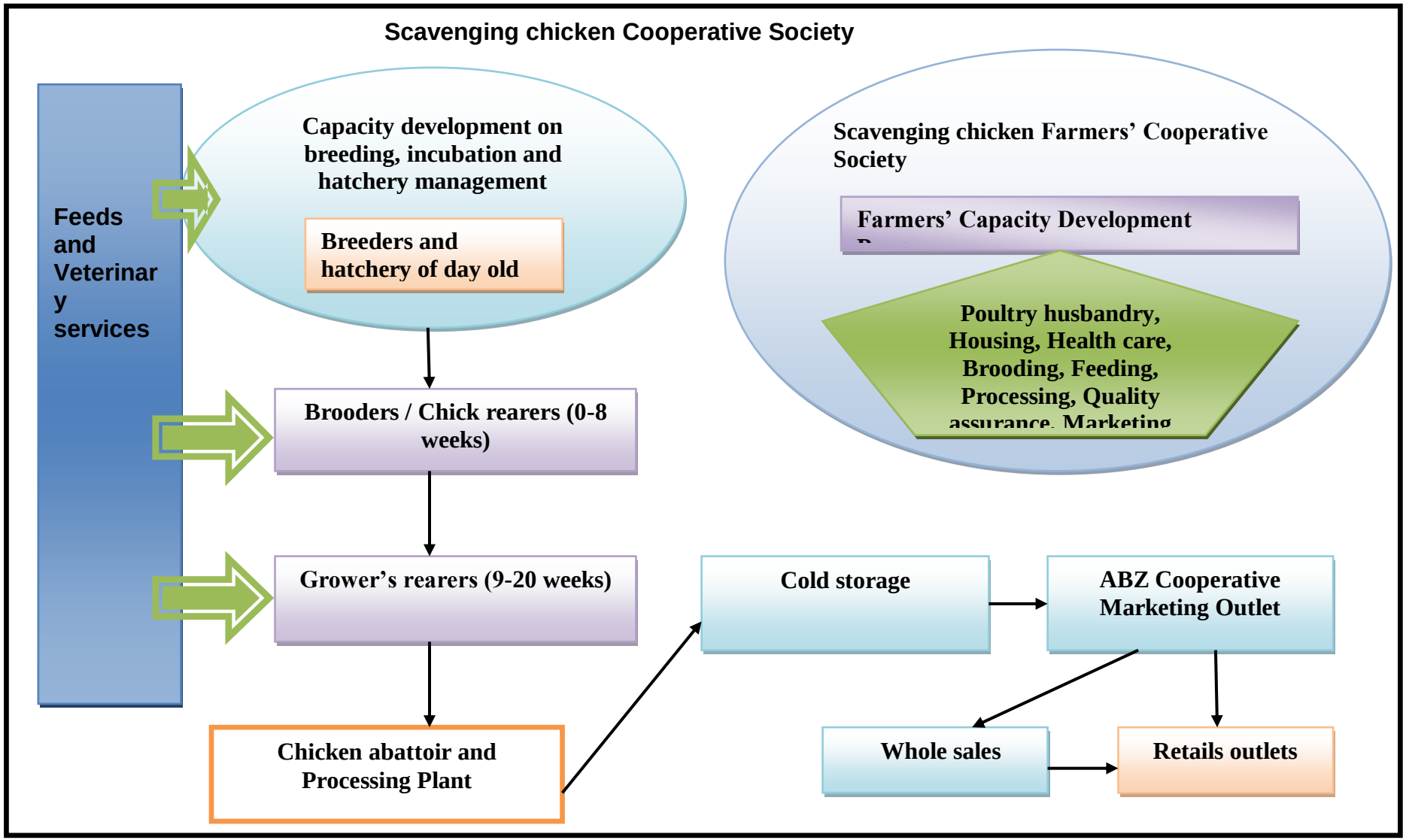
a) The model designing was on the principles of member-driven, member-controlled and member-responsive organization, which shall be run as a transparent, accountable, justice, fairness and respect for the core values of the organization emanating from the model;
b) The principle of "joint-use" concept as a basis for model operations;
c) The model value addition incorporation will give it an edge towards gaining competitive advantages in the market place;
d) The model sought to create strong linkages with all the stakeholders in the SCP industry. The interface will create a forum for support to members through capacity training, credit facilities and input support;
e) A catalytic mechanism is envisaged that will promote cohesion due to the willingness / interest factor embedded rather than persuasion for membership approach;
f) The model envisaged service delivery directly in response to the felt-needs of members. It will serve the members and at the same time be under the control of the members.

4.1 Role of extension services in SCPM

a) Farm guidance: The capacity development of the farmers in all aspects of the SCP value chains;
b) Scavenging Chicken Production Cooperative Society: Capacity development shall include, management, record keeping, conflict resolution, leadership training, and membership cohesion strategy;
c) Market intelligence information: Regular provision of market information to the society that is directly proportional to the enhancement of the added value chains;
d) Financial training: The extension workers shall train the farmers on financial management, sourcing loan and repayment strategy.

5. CONCLUSION

The study focused on the design of a Scavenging Chicken Production Model (IPPM) for scavenging chicken farmers in the Eastern Cape Province (ECP). The study draws on the working modalities of the Bangladesh Poultry Model, the Rakai Model in Uganda, Research Into Use (RIU) achievement in Tanzania, and the Benin Model. The development of the conceptual framework was based on the concepts of an "open social system" that are based on productivity, efficiency, stability, durability, compatibility and equity. A theoretical model SCPM was developed with components that include: The Scavenging chicken Farmers' Cooperative Society otherwise to be known as *Abafuyi Benkukhu Zemveli* (ABZ), the SCFs, the Breeders and Hatcheries, Veterinary services, Feed mills, the SCF rearers, Capacity development, Chicken processing plants, and Marketing. The model was designed to graduate the resource-poor households out of extreme poverty to more stable and sustainable livelihoods. The model aims to provide core values to the members through value chain components, cooperative society management (with special focus on the savings culture) and food security.


Scavenging chicken Cooperative Society
Feeds and Veterinary services
Capacity development on breeding, incubation and hatchery management
Breeders and hatchery of day old
Brooders / Chick rearers (0-8 weeks)
Grower's rearers (9-20 weeks)
Chicken abattoir and Processing Plant
Scavenging chicken Farmers' Cooperative Society
Farmers' Capacity Development
Poultry husbandry, Housing, Health care, Brooding, Feeding, Processing, Quality assurance, Marketing
Cold storage
ABZ Cooperative Marketing Outlet
Whole sales
Retails outlets

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Back to Table of Contents

THE ROLE OF PUBLIC PRIVATE PARTNERSHIPS IN COMMERCIALISATION OF SMALL SCALE IRIGATION FARMERS IN TAUNG, NORTH WEST.

Stevens, J. B.[36] & Mbedzi, A.[37]

This PDF File will be separate on the "Proceedings of Conference 2018" webpage. We could not have it in the Proceedings document.

Back to Table of Contents

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AN ASSESSMENT OF THE ROADMAP TO SUCCESSFUL COMMERCIALISATION OF SMALLHOLDER PRODUCERS: IMPLICATIONS FOR BOTH PUBLIC POLICY AND EXTENSION AND ADVISORY SERVICES IN SOUTH AFRICA.

Mthembu, N. N.[38]

ABSTRACT

The drive towards smallholder commercialisation holds much anticipation and expectation to deliver on the objectives of the 2030 Vision expressed in the National Development Plan of poverty eradication, economic growth and job creation in South Africa. The paper seeks to unpack the roadmap to smallholder commercialisation by assessing underpinning theoretical conceptual frameworks, philosophies and critical success indicators drawing from an extensive review of empirical case studies so as to inform policy reforms and guide extension and advisory services provision in South Africa. The effects and impact of smallholder commercialisation was analysed across three process models applied in Africa to draw critical success indicators and broad lessons for the South African public policy environment. Socially-embedded structural and institutional bottlenecks were analysed using neo-liberal and developmental philosophies and were found to further perpetuate the plight of marginalised and vulnerable groups of smallholder producers during commercialisation. The paper recommends paradigm shift and policy reforms that will level the playing field through the introduction of radical structural adjustments to alleviate limiting factors to smallholder agrarian capital accumulation, foster entrepreneurialism, stimulate rural economies, and address transformation in communities (i.e. break down non-progressive class and gender-oriented practices). Responsive, highly competent and professional extension services will be in high demand during agrarian diversification and transformation processes to provide cutting edge information and technical innovations to producers hence the continued professional development of extension practitioners cannot be overemphasised in this regard.

Keywords: accumulation, commercialisation, entrepreneurialism, extension, reforms.

1. INTRODUCTION

Agriculture plays a critical role in livelihoods, employment, income growth, food security, poverty alleviation, socio-economic development and environmental sustainability in developing countries. However, the smallholder farming sector, which constitute the bulk of the rural poor has not fully benefited from agriculture's multiple functions because of the predominant practice of consumption-oriented subsistence agriculture which excludes them from the formal market system and the related income-mediated benefits (Zhou et al, 2013:2599). In light of this (Vink et al, 2012:1) mention that since the 1990's a range of development models have emerged in South Africa and elsewhere to link smallholder farmers through business mode models – contracting, out growers, equity and shareholding - into the general commercial agricultural support system. They confirm that smallholders in the former homeland areas were generally not included in such recent "commercialisation" development models and remained largely neglected as extension services, funding support and infrastructure had effectively broken down. The marginalisation and vulnerabilities

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characterising smallholder agrarian systems are also reaffirmed by other scholars (Tapela, 2008:181, Cousins, 2009:3, Nwafor, 2015:1 and Khapayi and Celliers, 2016: ix).

Noting that commercial transformation of subsistence agriculture is an indispensable pathway towards economic growth and development for many agriculture dependent developing countries (Gebremedhin & Jaleta, 2010:14) accelerated growth in agriculture through commercialisation of smallholder agriculture has recently become the focus of numerous national policy frameworks as it is believed that it will translate into broad-based growth and development in rural areas (Leavy and Poulton, 2007:3).

The Southern African community has embraced this paradigm shift given the evolving environment driven by growing population, urbanization, income, global interconnectedness, policy reforms, technology, food industry restructuring and climate change which all present opportunities for smallholder market participation (Zhou et al, 2013:2600). Within the South African context agrarian transformation is defined as rapid and fundamental change in the relationship between systems and patterns of ownership and control of the means of production (DRDLR, 2013:4). This definition is cognisant of tensions and dynamics within social reproduction by smallholder producers and accumulation of agrarian capital (Mtero, 2012: ii) and acknowledges the structural limiting factors underpinning the current food regime which Oya (2012:2) addresses in his definition that agricultural commercialization involves diverse institutional arrangements, each with varied associated labor regimes and implications for land tenure, land concentration and for agrarian structures. Scoones (2015:v) therefore calls for an assessment of the impacts of commercial agriculture that takes a rounded picture, across genders, generations and classes, and so take a wider livelihoods perspective, seeing how people combine accumulation, reproduction, investment and so on across different activities and spaces.

There is a growing literature on smallholder commercialisation showcasing recent studies in South Africa that highlight key concepts, complexities and research gaps on the discourse. In 2008 Tapela's research study on vulnerability and marginalization in selected small-scale irrigation schemes in the Limpopo Province indicated that existing approaches to agricultural commercialization may not reduce rural poverty and inequality noted that although such approaches help to integrate resource-poor irrigation farmers into globalized commodity production sectors, they could undermine the livelihoods of the poorest and most vulnerable in these communities (Tapela, 2008:197). Similar issues and unintended effects were recorded by Leavy and Poulton (2007:3) wherein benefits accrued to larger, more powerful players and to the detriment of smallholder farming. This was later confirmed when a study conducted by Nwafor (2015:2) to examine the potential for commercialization among selected small-scale potato farmers in the Eastern Cape Province found that producers were below the half-way point to commercialisation due to lack of access to basic support services and bottlenecks to entry in formal markets. The wide literature suggests that processes to commercialisation directly and indirectly result in adverse effects on smallholder producers which Mtero (2012:ii) explains when he argues that the process of capital accumulation, and associated trajectories of increased centralisation and concentration, is critical to understanding the social reproduction and accumulation dynamics of small scale farming in the countryside. His study of the massive maize production schemes in the Eastern Cape Province found that commercialisation through the introducing 'modern' farming techniques and agribusiness principles does not remove the fundamental tension between the reproduction or accumulation of agrarian capital, on the one hand, and the social reproduction of the rural poor involved in small-scale farming.

A better understanding of specific factors that limit the development of emerging farmers is crucial in order to effectively prepare policies, development strategies, programmes and models aimed at supporting and enhancing the transition of emerging farmers into commercial agricultural farming (Khapayi and Celliers, 2016:25). This paper seeks to unpack the roadmap to smallholder commercialization by assessing underpinning definitions and concepts and presents a detailed analysis of three process models to commercialization in Africa. The critical success indicators are also discussed with the aim of drawing lessons for policy reform and to guide extension and advisory services provision in South Africa.

2. METHODOLOGY

The paper is research oriented and focuses on the philosophical dimensions associated with agrarian diversification and transformation as key features of smallholder commercialisation. No new study was undertaken for the purposes of developing this paper. As such an exhaustive literature review was consulted from which the definitions, key conceptual frameworks and discussion themes were derived. A review of high impact evaluation studies based on empirical evidence highlighting the effects and outcomes of smallholder commercialisation was done to draw critical success indicators and broad lessons for application to the South African policy environment and general agrarian system.

3. LITERATURE REVIEW

3.1 Conceptual roadmap to Agricultural Commercialisation

Theoretically the process to agricultural commercialisation is as a result of structural agricultural transformation processes in which producers shift from mainly consumption-oriented subsistence production towards market- and profit-oriented production systems (Oya, 2012:3). The process is progressive in nature (Pingali & Rosegrant, 1995:171) as it entails increased integration of producers into the exchange economy. This shift is marked by the deliberate move to competitively satisfy market needs for profit; increased recognition of farming as a business venture; participation in input and output markets (Kabiti et al, 2016:10); uptake of and investment in efficient technologies as well as strong formal linkages with other value chain actors. Other scholars concur with these definitions indicating indices to measure the degree of commercialisation have been proposed such as the value of farm sales over the value of all farm production (Wiggins et al, 2010:5; Wiggins et al, 2011:18 and Zhou et al, 2013:2561).

The underlying conceptual framework, as depicted in Table 1, driving the roadmap to commercialisation is adapted from Pingali & Rosegrant (1995:172) who explained that as economies grow, households shift away from traditional self-sufficiency goals and towards income and profit-oriented decision making, so farm output is accordingly more responsive to market trends. This process to commercialisation is highly dependent on access costs, asset endowments and risk propensity of farming households (Fredriksson et al, 2017:39) and thus the returns to intensive subsistence production systems that require high levels of family labour generally decline relative to production for the market with predominant use of hired labour. The proportion of farm income in total household income declines as family members find more lucrative non-agricultural employment opportunities. This widely accepted (Hall et al, 2017:516 and Wiggins et al, 2011:17) conceptual framework is presented as a qualified and relevant paradigm shift to understanding the roadmap to smallholder commercialisation.

Table 1: Conceptual Roadmap to agricultural commercialisation as adapted from Pingali & Rosegrant (1995:172)

Level of Market Orientation	Farmer's Objective	Sources of inputs	Product mix	Household income sources
Subsistence Systems	Food self-sufficiency	Household generated (non-traded)	Wide range	Predominantly agricultural
Semi-commercial systems	Surplus generation	Mix of traded and non-traded inputs	Moderately specialised	Agricultural and non-agricultural
Commercial systems	Profit maximisation	Predominantly traded inputs	Highly specialised	Predominantly non-agricultural

The framework is navigated in relation to the case study by Hall *et al* (2017:516) in an attempt to better understand the determinants, processes and resulting effects-both positive and negative- of commercialisation. This presents an opportunity for South African public policy to learn, adapt and deliver on its vision as the choice of farming model will thus be fundamental to the nature of the required farmer support services (Vink *et al*, 2012:5).

3.2 Three process models to smallholder commercialisation in Africa

The paper draws from the most recent literature Hall *et al* (2017 :516) to generate an in-depth analysis of the processes and effects of smallholder commercialisation including lessons for South African public policy and Extension and Advisory Services are presented in Table 2. The authors have tracked the roadmap acknowledging the long history of attempts to encourage commercial agriculture across much of sub-Saharan Africa. Past efforts in the colonial period have included the establishment of private estates and contract farming (Bates, 1981:119; Heyer *et al*, 1981:95 and Vink *et al*, 2012:7) and the period of immediate post-independence gave rise to state-owned and-managed estates. Outgrower arrangements, too, are a model that has been encouraged across diverse crops- cocoa, cotton, tobacco, sugarcane, coffee and tea- as a means of integrating smallholder family farmers into commercial and often transnational value chains. The study findings are also supported by a wide literature (Loewenson, 1992:10; Ferguson, 2006:50; Oya, 2012:4; Wiggins *et al*, 2011:20 and Zhou *et al*, 2013:2605).

Table 2: Outcomes and impact of smallholder commercialisation

Process Models of Commercialisation in Africa (Adapted from Hall et al, 2017)	Effect and Impact of commercialisation on pillars of a typical agrarian system				Lessons for Smallholder Commercialisation in South Africa
	LAND	LABOUR	LIVELIHOODS	LINKAGES TO LOCAL ECONOMY	
Plantations/Estate Farming- *defined as large, self-contained agribusiness farms that are vertically integrated into value chains. While they are often associated with one major crop, this is not always the case.*	Potential for land dispossession and displacement of people due to high demand for large tracts of production area. This leads to complex land tenure security issues Potential loss of local environmental biodiversity brought on by specialisation on high value crops and intensification	Significant employment creation (casual and permanent) indicating improvement in incomes and improved quality of living at household level (nutrition, education	Erodes community's both access and user rights to land and land based resources resulting in insignificant improvement in diversification of rural livelihoods	Poor integration with local economy given a high reliance on formal and tight value chain at regional and global level. Hence weak or no backward and forward linkages to local economy	Alignment to the objectives of Outcomes 4 and 7 to protect limited arable land and water resources and preserve biodiversity in the wake of climate change Provision of comprehensive support to support inclusive and meaningful participation of smallholder producers in the exchange economy (local and regional) Enforcement of fair labour practices for farm workers Creation of favourable policy environment Improved research and innovation for specialisation and better farming methods Strengthened linkages to local economies
Out grower Schemes/ Contract Farming- *defined as involves the development of processing facilities (usually but not always with a core commercially operated estate), through which small producers are incorporated into commercial value chains in that Outgrowers are generally smallholders using their own land and labour for production, but with a commercial relationship for output marketing and often also input supply.*	Smallholders have secure land tenure in that they own or have access to land. Expansion of landholdings and area under production is fixed to contractual obligations	Nonflexible long term binding contracts hinder prospects for commercialisation Loose contracts allow for straddling of livelihoods especially by women Room for exploitation by contractors exists	Stable income source for growers. Potential for accumulation from below. However, degree of beneficiation is relative as a result of complexities resulting from class dynamics and social differentiation characteristic of local agrarian economies	Significant linkages to local estates, agro dealers, technical support services including agro processing plants which stimulates rural economic growth Potential driver of increased participation in the exchange economy	Considerations: Exploration of regulating informal land rental markets for increased area under production Review of acceptable types of collateral - Review of customary land tenure systems towards privatisation More flexible and favourable out grower contracts that promote straddling of livelihoods sources thus promoting social reproduction and have potential for expanding landholdings Consideration of innovative means of producer market orientation and participation for increased returns
Medium Commercial Farming- *defined as medium-scale commercial farmers who accumulate land via rental or sale, have contiguous or nearly contiguous landholdings in the same vicinity, and often specialize in the same crop or commodity.*	High demand for land often resulting in land consolidations or displacement of local residents-state zoning for block farming Exploitation-land grabs	Elite capture-support biased towards wealthy powerful males Exclusion of women due to patriarchal and intergenerational inequalities-educated adult males preferred	Major source of wage employment but of poor quality-minimum wage and substandard living conditions of farm workers Prospects of accumulation from below- only for those who can invest resources and take risks and not for workers/landless-class inequalities	Significant linkages to local, regional and global exchange Catalyst for rural economic growth and rural development Potential driver of increased participation in the exchange economy-commercialisation	Land availability issues: • Rising need for radical progressive land reform implementation • Rising pressure on high potential agricultural land • Rising price of agricultural land per hectare due to pressures and scarcity Guard against non-inclusive

Process Models of Commercialisation in Africa (Adapted from Hall et al, 2017)	Effect and Impact of commercialisation on pillars of a typical agrarian system				Lessons for Smallholder Commercialisation in South Africa
	LAND	LABOUR	LIVELIHOODS	LINKAGES TO LOCAL ECONOMY	
			Succession planning-lack of willingness to take over by next generation Inheritance by women is contested		market participation - elite capture Strengthen institutional mechanisms including governance Advocate for sector transformation agenda - youth, women and people with disabilities Clear beneficiary targeting for commercialisation: Lacking or varying degrees of capacities and competency levels across class, gender may further entrench structural class dynamics and social differentiation

3.3 Critical success factors for smallholder commercialisation: Findings from a government-supported Diagnostic Evaluation of the Government Support to Smallholder Producers.

Nwafor (2015:4) reviewed an extensive body of literature which suggests that improved research and extension services, favourable economic policies, capital markets for risk spreading, property rights and improved rural infrastructure that will facilitate a smooth transition to successful smallholder commercialisation. It is also suggested that the existence of a well-functioning product and factor market is important, while government is expected to play a strong role in facilitating the transformation process. Whilst these success indicators point to favourable external factors, Xaba (2014:ii) presented internal factors which include but not limited to strategic planning, clear communication of organisation`s objectives and goals, beforehand knowledge of the market, promotion of own brand, conservation of agricultural practices, knowledge of seasons, timely conveyance of produce to the market, understanding of global agricultural trends, exploitation of ICT facilities, ease of access to funding, and qualified financial management skills. The study by Kabiti et al (2016:11) reported similar success indicators in the context of Zimbabwean smallholder commercialisation with a distinction made between input and output commercialisation. From the input side, factors included the area under cultivation, irrigation availability, distance to input market and gross production value whereas from the output side factors included household labour size, farming experience of the household head and access to non-farm income.

An investigation of the critical success indicators for smallholder commercialisation in South Africa is presented drawing on the findings presented in the diagnostic evaluation report of government supported smallholder producers (Khulisa Management Services, 2016: ix) and are discussed in relation to the wider literature with a view to promote improved policy and programme planning for smallholder commercialisation in South Africa. The evaluation affirmed findings of Xaba (2014: ii) and Kabiti et al (2016:11) as findings suggested that successful projects were led by farmers with prior experience, good financial and physical resources (both land and machinery) and available markets. Those who were in a position to take advantage of government programmes through their own assets (either experience,

network, resources) were able to sustain initial programme success. This supports the philosophical rationale of social differentiation and class dynamics within agrarian systems whereby those likely to succeed are the 'haves' in terms of access to crucial resources and strong linkages to the local economy. These are farmers who have acquired knowledge and skills thus setting then apart from the 'have nots' who most likely are subjected to some degree of social-economic and political inequality or exclusion (Cousins, 2009:9).

According to Wiggins et al (2011:14) this description best fits the demographic profile of wealthy, educated males. They associate this class to have capital and better links to traders and processors. This dynamic is further supported by Kabiti et al (2016:13) who found that success in market participation by smallholder producers may require either formation of partnerships with established farmers as evidenced in South Africa or membership to agricultural marketing cooperatives, although very poor farmers maybe left out. This evidently affirms the perpetuation of deeply entrenched social dynamics within current agrarian systems from a class analytical perspective (Cousins, 2009:10). Thus, smallholder commercialisation programmes need to advance the transformation agenda in the sector premised on principles of equality and inclusivity in light of the Amended AgriBEE Sector Code of 2017 which seeks to facilitate Broad-based Black Economic Empowerment in the agricultural sector by implementing initiatives to include Black South Africans at all levels of agricultural activity and enterprises (DAFF, 2017:4-5). Organisational reforms which promote a minimum threshold involvement of youth and women in enterprise ownership and management to effectively shift intra-household capitalistic exploitations and balance power relations within commercial agrarian systems is encouraged.

The evaluation further acknowledges that high probabilities for successful commercialisation is associated with smallholder projects were social relations are free of any dynamics and complexities and are characterised by clear institutional arrangements and efficient governance. This creates a favourable environment translating to buy in, collaboration, and effective ownership and leadership necessary for efficient business decision making. Making significant contribution to the business and taking risks were also found to be critical in the process of agrarian transformation including high levels of involvement in the management and operations of the business (Khulisa Management Services, 2016: xii). Vink et al (2012) also alluded to the proactive entrepreneurial nature of producers as they envisage revised State funding packages for commercialisation with an added element of co-funding by smallholder producers in their quest to commercialise their agrarian systems. This was echoed by Khulisa Management Services (2016: xv) who concluded that the provision of microfinance and grants without requisite support are not a 'magic bullet' to stimulate change in the rural poor. Only producers who are motivated to move towards commercial production are likely to benefit.

4. DISCUSSION

4.1 Romanticising Commercialisation: Caution for public policy development

The case by Hall et al (2017:516) resonates with a wider literature (O'Laughlin, 2001:2, Peters, 2004:94, FAO, 2009 and Bernstein, 2010:1 etc.) which introduces a paradigm shift in the approach to commercialisation given the vast factors at play in existing food regimes. These scholars in their examination of neo-liberal and developmental philosophies ignite new ways of thinking which may include asking sensitive questions on the knock-on effects of social differentiation entrenched within customary law practices upon entry of capitalists and the State into rural agrarian systems and the power relations that ensue. Table 3 below summaries the structural and institutional factors characterising agrarian systems for policy

makers to begin to understand and critically analyse the would-be success indicators for smallholder commercialisation in South Africa.

Table 3: Underlying structural and institutional factors associated with the commercialisation of agrarian systems in rural South Africa

Political Economic factors	**Social factors**	**Property Rights**
Elite Capture: The State Chiefs Capitalists-large corporates	***Social Differentiation:*** Class and Gender dynamics Fragile Kinship relations Intergenerational exclusions	***Land Scarcity:*** Land grabs Farm consolidations Competing land uses
Impact on labour trends-capital accumulation vs social reproduction	Emerging Class-Who benefits	Degradation of biodiversity
Who gains vs losses livelihood including livelihood straddling	Perpetual Inequalities	Dispossession of community's access and user rights
Inclusions vs Exclusions in rural economy	Violation of human rights	Slow pace of land reform
Impact on linkages to mainstream economy (loose and tight value chains)	Impact on long term generational relations-succession planning	Insecure tenure rights

Table developed by author drawing from the wider literature (O'Laughlin, 2001, Peters, 2004, FAO, 2009 and Bernstein, 2010 etc.)

The positive effects of smallholder commercialisation on the local economy and multiplier effects on supporting economies through backward and forward linkages has been well documented (Jayne *et al*, 2015:3; Gebremedhin & Jaleta, 2010:4; Wiggins *et al*, 2011:17; Zhou *et al*, 2013:2599 and Kabiti *et al*, 2016:16) and can be summarised as follows:

- Increased participation in exchange economy (local, regional and global level);
- Increased marketable output;
- Thriving local economies through increased demand for traded goods and services;
- Increased demand for specialised product and services development and more efficient delivery thereof including extension and advisory services;
- Improved research and innovation which leads to improved farming methods and technologies;
- Employment creation in agriculture and non-farm sectors;
- Increased and sustainable household income sources which translates to improved food security, nutrition, access to health care and education;
- Improved organisational regimes (policy reforms on governance, market access, trade, land).

Commercialisation is a fundamental feature in structural transformation processes by leading to agricultural diversification and transformation (Jayne *et al*, 2011:14). The transformation process is instigated by a myriad of drivers of change and determinants which either act as enablers or constraints (Pingali & Rosegrant, 1995:179) that interplay within rural agrarian systems which manifest in both negative and positive effects. Cousins (2009:3) in his assessment using a class-analytical perspective provides an understanding on how land, labour, and capital is managed within the dynamic nature of human activity, fluid economic landscape which underpin characterisation and definitions of producers. The effects in turn influence the dynamic nature of production factors namely land, labour, livelihoods and linkages to the exchange economy (O'Laughlin, 2001:2, Bernstein, 2010:9 and Hall *et al*, 2017). These further dictate emerging patterns of accumulation and exclusion by some groups in rural economies as depicted by Hall *et al* (2017:516) in Table 2 and Table 3. The earliest misgivings about the actualisation of the benefits of smallholder commercialisation were forwarded by Leavy and Poulton (2007:4) who critiqued that the strategy will not bring benefits to the majority of rural households, either directly or at all. Instead, they feared that efforts to promote a more commercial agriculture will benefit primarily large-scale farms. At

best, the top minority of smallholders will be able to benefit. According to Peters (2004:98) and Nwafor (2015:5) the tension between accumulation and reproduction (Mtero, 2012: ii) results from structural inequality, social differentiation and exclusion which they affirm to be visible outcomes of commoditization, structural adjustment, market liberalization and globalization.

Inversely Wiggins *et al* (2011:21) notes that the same attributes are an essential bedrock to smallholder commercialization in that from the demand side, the resulting effects have been higher prices and better access to markets while on the supply side, it has been the diffusion of improved technology. The nuances characterising this discourse necessitate policy developers to conduct further feasibility and impact assessments of which process model of commercialisation is likely to yield more positive outcomes at individual, household and local economic level. Hall *et al* (2017:516) seemed to support this as they concluded that whether or not investments in African agriculture can generate quality employment at scale, avoid dispossessing local people of their land, promote diversified and sustainable livelihoods, and catalyse more vibrant local economies depends on what farming model is pursued. This is largely due to the fact that different process models of agricultural commercialisation do not always deliver what is expected of them in part because local conditions play a critical role in the unfolding outcomes for land relations, labour regimes, livelihoods and local economies as discussed in this paper (Hall *et al* (2017:516).

Mtero (2012: 2) warned that commercialisation should not be hyped as a universal solution for the reversal of de-agrarianisation. The sentiment is shared by Wiggins *et al* (2011:14) who noted that smallholder commercialisation many not yield the expected gains from specialisation and economies of scale, and that it will not, on its own be a prime engine for agricultural productivity growth. Nevertheless, they acknowledge the potential impact of commercialisation in income generation for producers and export revenue for the country. The work of Zhou *et al* (2013:2599) and Khapayi & Celliers (2016:38) also conceded that smallholder agricultural commercialisation has been plagued with undesired consequences however they concluded that positive results presented in literature motivate for further empirical research to determine more convincing results. They argue that the basis for most critique of commercialisation is due to limitations in inefficient policies, strategies, institutions, attitudes and distribution of benefits and costs within households and communities (Zhou *et al*, 2013:2602). Whilst policy and strategic intervention is necessary in creating a favourable environment for agrarian transformation, Mtero (2012:22) recommended producer-oriented interventions such as the assessment of smallholder conditions, options and preferred methods to optimise market performance including the determination of decision making around household food security, nutrition, employment, land tenure security and coping with risk. The Ethiopian case (Gebremedhin and Jaleta, 2010:23) in which literate households were found to have better access to information and better able to process it than illiterate households, thus more able to see the benefits from market orientation is a clear indication of the in-depth class dynamics that exist amongst farming communities. This further justifies these former recommendations by scholars.

Frediksson *et al* (2017:37) also emphasized the significant role that family dynamics have in understanding commercialization decisions. This pprompts further empirical studies on research gaps identified by Zhou *et al* (2013:2608) on models to stimulate action, attitude change, entrepreneurism and investment by smallholders. These authors are supported by Wiggins *et al* (2010:7) who echoed the vacuum in literature which explores the relation of commercial agriculture, in which ever form it takes, to the internal and external environment

which amongst others, includes the local economy; labour trends; livelihood profiles and so forth.

4.2 Implication for public policy in South Africa

Wiggins *et al* (2011:21) identified the role of the State within the contract process model as to offset imbalances of power between producers and enterprises through the establishment of secure land tenure systems, improved support services such as access to information, markets and reliable infrastructure. Negotiation of better deals on behalf of producers, strengthening linkages of producers to relevant stakeholders through partnerships as well as the provision of incentive schemes in the form of subsidised packages were also recommended as opportunities for the State to optimally utilise to the benefit of smallholder commercialisation efforts (Wiggins *et al*, 2011:21).

Given the complexities and peculiarities in the internal and external environment in which processes of commercialisation unfold from one process model to another, government ought to embark on policy reforms and increase investment into commercialisation with far greater understanding of expected outcomes. Varying direct and indirect effects of commercialisation will be more likely visible in rural agrarian economies with a widening gap between those first to seize opportunities to commercialise as compare to their more vulnerable and marginalised neighbours. As this assessment has shown that the contributing success factors points to access and control of the means of production i.e. land, labour, capital and strong linkages to local economy, government has a huge task ahead to ensure gradual systematic inclusion and equality to safe guard against capitalistic exploitation of vulnerable groups in rural agrarian societies. Essential the objectives of State policy reforms should be paradigm shift towards levelling the playing field through the introduction of radical structural adjustments that seek to eradicate limiting factors to smallholder agrarian capital accumulation, foster entrepreneurialism, stimulate rural economies, and address transformation in communities (i.e. break down class and gender-oriented practices). Further policy reforms that redress current property rights regimes are necessary as land ownership is the preferred option, but is not a necessary condition for the commercialisation of agriculture. Alternative arrangements such as rental agreements of sufficiently long duration to justify investment could also be viewed as an alternative mechanism. Urban land development plans should also provide for smallholder production (Vink *et al*, 2010:8-9).

4.3 Implications for Extension and Advisory Services towards successful commercialisation of smallholder producers

As agrarian transformation and diversification occurs, extension and advisory services would also have to be ready to respond to evolving producer needs such as quality control and traceability measures, supply chain management and product insurance schemes (Vink et al, 2012:9). These calls for the establishment of substantial institutional support frameworks in which there are strengthened collaborations between extension, research institutions and commodity organisations. This broadly speaks to the expansion of agricultural services (extension, credit, market information) which have already shown to have significant impact on the intensity of input use, agricultural productivity and market participation for Ethiopian smallholder producers. This success was achieved through the enhancement of farmer skills and knowledge, strengthened linkages of producers with modern technology, and stimulation of market orientation and market participation of producers (Gebremedhin and Jaleta, 2010:23). Continued professional development will ensure that extension and advisory services is relevant, reliable and efficient. The paper also concurs with the recommendations

as stipulated in Chapter Six of the National Development Plan that given the expanded role of extension and advisory services, innovative means are required for enhanced education and training of personnel through farmer-to-farmer skills transfer and through collaboration with commercial farmers across high potential commodities (NPC, 2011:194-5).

5. CONCLUSION

This paper has highlighted the conceptual roadmap, requisite critical success factors and drew from empirical research an in-depth analysis of likely process models that can be used to facilitate successful smallholder commercialisation in South Africa and other developing nations. The analysis using neo-liberal and developmental philosophies has shed light into the relations between access, ownership and management of the means of production and how this translates to effective orientation and participation in local exchange markets. The impact of smallholder commercialization can be far more significant given increased beneficiation between the key pillars of production facilitated within a favourable policy environment. This must include the review of existing property rights framework through thorough assessment of the regulation of informal land tenure systems and the redesign of development support (financial and technical extension and advisory services).Opportunities to foster successful integration of smallholder enterprises into the local exchange economy that will give rise to tangible agrarian capital accumulation and sustainable social reproduction remain to be explored through public-private partnerships at national, provincial and local level.

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Back to Table of Contents

ADAPTATION TECHNOLOGIES FOR LIVESTOCK FEED SHORTAGES FOR SMALLHOLDER FARMERS: EXTENDING THE LIVESTOCK INFRUSTRUCTURE PROJECT OF THE AGRICULTURAL RESEARCH COUNCIL.

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ABSTRACT

Smallholder farming in Africa is expected to endure some of the worst impacts of climate change due to high vulnerability that is compounded by their general lack of resources needed to adapt effectively to climate change. Therefore, it is essential that smallholder farmers in Africa be supported with adopting technologies that can improve their resilience to the impacts of climate change. In South Africa, the Agricultural Research Council (ARC) constructed and refurbished communal infrastructure that facilitated animal health, handling, and sale management in some rural areas of KwaZulu Natal, Limpopo, and Eastern Cape provinces. The infrastructure rolled out improved the resilience of communal farming to the impacts of climate change. However, the project did not provide technologies for adapting to the shortages of feed resources on account of climate change. Therefore, the contribution of this study is a literature review of the various adaptation strategies to feed shortages for smallholder farmers. The intention is to assist the ARC to identify a suitable solution for improving the adaptive capacity of the communal farmers, who were the beneficiaries of the infrastructure project, to the increased shortages of livestock feed due to climate change.

1. INTRODUCTION

The global phenomenon of climate change and variability has had severe impacts on agricultural productivity, food security, and farmer livelihood. Climate change is expected to continue and Africa, especially the southern African region, is expected to bear some of the worst impacts due to high vulnerability and lack of effective adaptation (Davis & Vincent, 2017). According to Vanderhaeghen & Hornby (2016) the droughts that occurred in 2010 and 2014 had devastating effects on the livestock of communal farmers in some parts of South Africa with families, who depend heavily on them for their livelihood, losing scores of them at once for lack of water and grazing pastures. Furthermore, the increase in the impacts of climate change was noticeable in the droughts of 2014 as compared to those of 2010. Vanderhaeghen & Hornby (2016: 44) interviewed a smallholder farmer who observed that in the drought of 2010 grass recovered when the rain eventually came whereas in the drought of 2014 grass had not recovered even after the rain came. Climate change increases the need for

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research on adaptation strategies for smallholder farmers on *strategies and technologies* especially for communal farmers who are generally resource-poor.

We identified an existing project conducted at the ARC that exemplified the *use of appropriate technologies* to improve several performance measures. The project was a pioneering project on adaptation technologies for communal farmers and entailed construction and refurbishment of communal infrastructure for animal handling, health, and sale management in certain communal areas of Eastern Cape, Kwa-Zulu Natal, and Limpopo provinces. The health condition and safety of the livestock were significantly improved, as well as the livelihood of the farmers who obtained access to more profitable markets.

The *problem is* that ARC's project did not provide any infrastructure to assist farmers with adapting to shortages of feed resources *on account of climate change*. A literature review was conducted in order to determine the extent of the *impact on feed resources by climate change* as well as the *available strategies and technologies for adapting to climate change* by communal farmers in South Africa. The intention of the study was to identify potential technologies to augment the communal infrastructure provided by the ARC so that communal farmers can effectively adopt practices for dealing with feed shortages and mitigate the impact of climate change on their operations. The research questions are as follow:
Main research question:

- Are smallholder farmers adapting effectively to the shortages of feed as a consequence of climate change?

Research sub-questions

- What are the different feeding strategies for mitigating the risk of climate change on smallholder livestock farming?
- Which of the feeding strategies have been applied in South Africa?

2. LITERATURE REVIEW METHOD

A protocol was developed based on the *eight steps to conducting a systematic literature review* by Okoli & Schabram (2010). The key words and search strings were developed as follows: climate change OR environment AND crop-livestock system OR cover crop AND smallholder as well as Livestock AND feed*_AND smallholder OR small-scale AND SLR OR systematic literature review. The databases that were included in the search were Google scholar, Scopus, National ETD Portal South African theses and dissertations, and UP Space of the University of Pretoria. The quality screening criteria for papers were as follows: only *peer reviewed articles* and only articles related to *ruminant livestock*.

3. LITERATURE REVIEW RESULTS

The next sections provide a summary of the literature review results, categorised according to three main themes: (1) climate change defined, (2) existing adaptation strategies for livestock feeding in smallholder farming, and (3) feeding strategies used by smallholder farmers in South Africa.

3.1 Climate change defined

Climate change and variability is the change of weather conditions over time and it is either caused by the human activities or the emission of the greenhouse gases from the industries (IPCC, 2007). The average temperatures and variability in climatic patterns change over long periods of time. Climate change threatens the future of agricultural sector due to the sensitive

nature of agricultural processes to climate change. Smallholder farmers in developing countries especially those in the rural areas are most vulnerable to the negative impacts of climate change such as increased frequency of droughts and floods (Mdoda, 2014).

3.2 Adaptation strategies for livestock feeding in smallholder farming

3.2.1 Mixed farming

The global phenomenon of climate change has severely affected global agricultural productivity, food security, and farmer livelihood. The increased frequencies of droughts and floods as well as increased average temperatures have resulted in the degradation of grazing pastures and reduction in crop yields thereby constraining feed resources for livestock. In the wake of climate change, the literature on the impacts of climate change as well as suitable adaptation strategies for the agricultural sector has increased tremendously in order to ensure agricultural productivity and food security. Most of the adaptation strategies have been developed within the context of mixed farming. In mixed systems, livestock provide draft power to cultivate farming land. Manure is used to fertilize soil, and crop residues are a key feed resource for livestock (Herrero et al., 2010). The different strategies are varied solutions to the challenge of achieving increased integration between crop and livestock production in a manner that creates synergies in the use of constrained resources for increased productivity and reduced environmental impact. Since crop and livestock farming complement each other (Herrero et al. 2010), the use of both improved forages and improved animal breeds can yield the same amount of food from a smaller area or more food from a similar area (Eisler et al. 2014). The ability of farmers to adopt the different adaptation strategies is not the same. Adaptation strategies vary based on factors such as farm size and income, access to credit, farming system, and access to markets. Smallholder farmers in developing countries, especially those in rural areas, are generally resource-poor and are hardly able to adopt adaptation strategies.

3.2.2 Feeding strategies used in countries other than South Africa

Salem and Smith (2008) present a review of a set of feeding strategies that have been developed for increasing small ruminant production in dry environments. Although the strategies were discussed in the context of sheep and goat feeding, they are also applicable to cattle feeding. Thornton et al. (2017) discuss the same strategies in the context of improving mixed farming systems in Africa south of the Sahara. The strategies discussed by (Salem & Smith, 2008) are improving the nutritive value of CRs; use of fodder trees and shrubs; forage conservation; and feed calendars, and compensatory growth. Crop residues (CRs) can be salvaged from crop farming for use as feed. Blümmel (2012) points out that CRs are an important strategic feed resource. However, CRs are known to be low in nutritive value as well as low in digestibility. Salem and Smith (2008) discuss the different technologies for improving the nutritive quality of crop residues including chemical treatment, particle size and other physical treatment, and supplementation. However, Salem & Smith (2008) indicate that the technologies have scantly been adopted by smallholder farmers.

Salem & Smith (2008) also advocate for the use of fodder trees and shrubs in supplementing low quality forages, including crops, for feeding ruminants. “Exotic species of trees are usually faster growing and many of them are leguminous, making them suitable for inclusion into cropping areas, for live fences, alley cropping and intercropping. The fixation of nitrogen, contribution to mulch and reduction in erosion is in addition to providing forage” (Salem & Smith, 2008: 182). The authors also discuss the uses of cactus in countries such as Brazil, Chile, Morocco, South Africa, and Tunisia as an emergency feed supplement in times

of droughts. Cactus is a hardy plant that can survive in dry environments and can provide nutritious feed for ruminants. Furthermore, Salem & Smith (2008) discusses the forage conservation technologies as well as the potential uses of agricultural by-product as supplementary animal feed. Excess forages harvested in the growing season can be stored as dry hay or as silage for use in the dry season. "The suitable method of ensiling will depend on the climate, use of the forage, the tools and machinery available, and feeding system" (Salem & Smith, 2008: 185). Rao et al. (2015) promoted the use of sown grass cultivars and legumes as part of the LivestockPlus concept which advances the use of forage-based crop-livestock systems in the tropics. All forages contain some protein, varying in amount between species, stages of growth and season. "Legumes are useful protein sources and, because of their ability to fix nitrogen in the ground, have the added advantage of improving soil fertility. Most grasses are rich in protein in the growing stages, but as the plant bulks and matures fibre levels increase and protein falls, thus increasing digestibility and intake. This is particularly marked where there is a pronounced dry season" (Elliot & Folkstern, 1961).

3.3 Feeding strategies used by smallholders in South Africa

The dependence on natural pastures, as main source of livestock feed, by smallholder farmers in South Africa is reported by many authors (Mdoda, 2014; Nompekela, 2016; Rao et al., 2015; Salem & Smith, 2008) and has exposed farmers greatly to the negative impact of climate change. Nompekela (2016) says that the reason for the great dependence on natural pastures by smallholder farmers is that they cannot afford to buy feed supplements. The increased occurrence of droughts on account of climate change has resulted in the degradation of the nutritive quality of natural pastures as well as curtailed crop and forage yields (Roa et al., 2015). Therefore, livestock productivity has been constrained by the decline in the supply of animal feed resources which become even more expensive to procure in the circumstances. Consequently, there has been an increase in the uptake of crop-livestock farming in South Africa as more farmers recognise the need to integrate crop and livestock production in order to reduce input costs as well as to ensure food security and livelihood.

However, there are limitations and challenges associated with the practice of mixed farming in the South African context especially among communal farmers. (Ngxetwane, 2011) found that farmers with a higher farm income were more inclined to adopt crop-livestock farming than those with less farm income. Moreover, it was found that the farmers with higher income were those that had larger farm sizes which were privately owned or used as part of the land redistribution for agricultural development (LRAD) programme. The LRAD/privately owned farms tend to be of medium to large size, have better access to formal markets, and practice better integrated mixed-farming systems. On the other hand, although many authors report high adoption of mixed-farming among communal famers, mixed-farming by communal farmers faces many challenges.

Communal farmers generally operate subsistence and semi-subsistence farming. Consequently, much of the crop output is used for household consumption with only crop residues provided as animal feed during winter (Nompekela, 2016; Shisanya & Mafongoya, 2016). Moreover, many of the same authors found that farmers still kept cattle primarily for social and cultural purposes rather than for commercial purposes. Other authors have found that communal farmers used supplementary feed to cope with livestock feed shortage in winter and some raised concerns about the dependency of communal farmers on constrained government's drought relief programmes (Mdoda, 2014; Nompekela, 2016; Shisanya & Mafongoya, 2016). Therefore, it seems that the reason for the proliferation of mixed-farming systems among communal farmers is more for household food security in the wake of climate

change than it is about increasing productivity. Evidently, communal farmers in South Africa have scantly adopted technologies for adapting to climate change thereby improving the resilience of their farming systems. Therefore, there is a pressing need for identifying more suitable and practicable technologies for adapting to climate change by communal farmers. A participatory approach is necessary given the challenges faced by farmers in order to ensure the uptake of the technologies developed.

4. RESEARCH GAPS

It is apparent that the adaptation practices of communal farmers in South Africa have not been effective in compensating for the shortages in feed resources caused by climate change, especially during the dry season. Communal farmers tend to prioritize the use of their crop produce for household consumption and in the dry season are likely to provide crop residues only to their livestock. The high dependence on the government's drought relief programmes and uncontrolled grazing betray lack of planning and risk management by communal farmers for the overwhelmingly evident impacts of climate change on feed resources (Shisanya & Mafongoya, 2016). The problem of feed shortage is merely one manifestation of the impacts of climate change on communal agriculture. Other problems include the increased prevalence of tick-borne diseases, increased stock theft due to the straying of animals in search of grazing pastures, and lack of access to markets (Nompekela, 2016; Shisanya & Mafongoya, 2016).

The ARC carried out a project that constructed and refurbished communal infrastructure for animal handling, health, and sale management in certain communal areas of Eastern Cape, Kwa-Zulu Natal, and Limpopo. In addition, the ARC provided training on good management practices based on a farmer participatory approach. The infrastructure installed consisted of dip tanks for tick control; crush pens and neck-clamps for animal handling; and auction yards for livestock sale. Farmers were involved at every stage of the project and were active in the identification of suitable infrastructure to meet their needs. The initiative increased productivity and income for communal farmers. As an example, the facility at Ndawana in the Eastern Cape resulted in significantly more animals auctioned and income received. Local farmers earned R3.5 million in the past year through sales, i.e. of 300 cattle selling at R12 000 on average. Figure 1 shows a schematic diagram of how the ARC and the partners it collaborated with in carrying out the project as well as the means by which the stakeholder engagement was facilitated. The Kaonafatso yaDikhomo Scheme (KyD) is a training programme that trains smallholder farmers on good farming practices. Farmers who were enrolled on the programme were used as participants in the project. The ARC collaborated with the Department of Environmental Affairs to inspect the environmental impact of the dip tanks that were used by farmers and to determine requirements for refurbishment or constructing new dipping facilities. The ARC also collaborated with the Human Science Research Council (HSRC) as well as the International Development Research Centre (IDRC) in order to determine, among other things, the needs of smallholder farmers in terms of animal vaccines and medication.

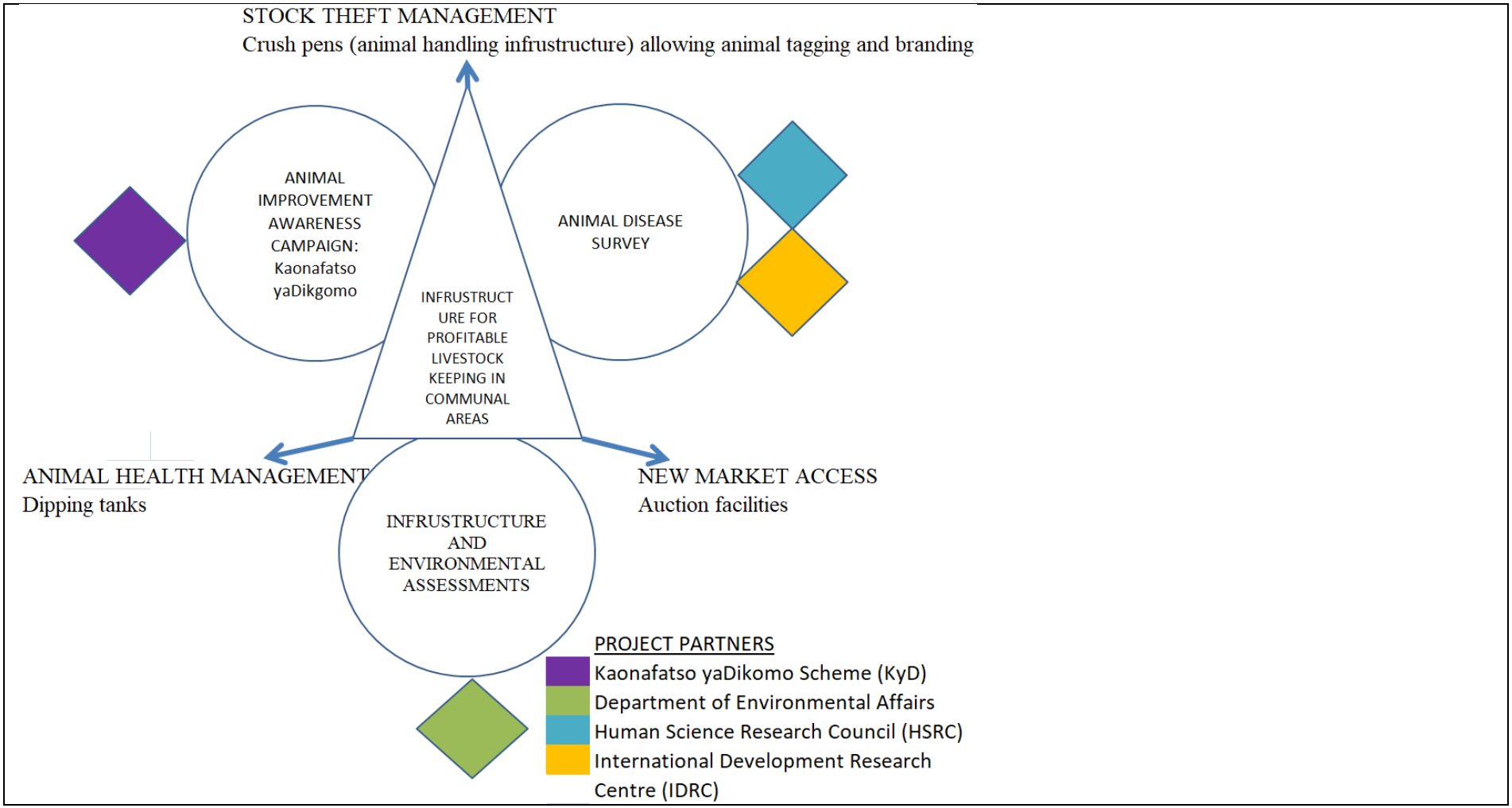

Figure 1: A schematic diagram of the livestock infrastructure project carried out by the ARC and partners

The project greatly reduced the impact of climate change on the farming operations of the communal farmers in respect of livestock health, handling, and sale management and these gains are expected to continue. However, no infrastructure and technology were provided for adaptation to the increasing shortages of feed resources including water. There is significant evidence in the literature for the need to assist communal farmers with adapting to the problems of *feed and water shortage*. Shisanya and Mafongoya (2016) suggested implementation of climate-smart innovations, such as advanced cultivars that include drought resistant crops and grass varieties. Rao et al. (2015) promoted the use of sown grass cultivars and legumes as part of the LivestockPlus concept which advances the use of forage-based crop-livestock systems in the tropics. Mdoda (2014) found that farmers suggested that more assistance be provided by the government with supplementary feed as well as the construction of communal feedlots where farmers could take their animals for fattening. The important role of water in livestock farming is recognised by many authors and they call for more practice of rain water conservation by communal farmers or the creation of dams for irrigation (Rao et al., 2015; Shisanya & Mafongoya, 2016).

5. PROPOSED FEEDING STRATEGY

The reviewed literature has shown that there are major deficiencies in the adaptation practices of communal farmers for adapting to climate change. Therefore, there is a pressing need for identifying more suitable and practicable technologies for adapting to climate change by communal farmers. A participatory approach is necessary given the challenges faced by farmers in order to ensure the uptake of the technologies developed. The reviewed literature also shows that there is a plethora of adaptation strategies and technologies that have been applied in countries other than South Africa that may be considered for application among communal farmers in South Africa. The most suitable strategy will be determined through a participatory approach that involves the ARC, the communal farmers, extension officers as well as other stakeholders. Due to the enduring reliance on grazing pastures by communal farmers, the sowing of more nutritious and environmentally hardy and friendly cultivars must be prioritized. The sowing of better grass cultivars would need to be supplemented with rotational grazing which will require training of farmers as there is evidence that many farmers graze their animals freely. Since many communal farmers are practicing mixed-farming, the physical and chemical treatment of crop residues as well as supplementary feeds such as legumes and agricultural by-products, for example, brewer's grains, need to be explored. The formation of associations for communal farmers can be a great way to achieve cost reductions in inputs through economies of scale as well as access to output markets through large selling stock sizes.

6. SUGGESTED APPROACH FOR FUTURE RESEARCH

The ARC demonstrated their ability to create infrastructure in addition to providing training on farm management practices. The project was necessary given that communal farmers are resource-poor and can hardly adapt to climate change. Dietz et al. (2013) define an enterprise as a intentionally created cooperative of human beings with a certain societal purpose thus Smallholder farms are enterprises and must be addressed as such. There is a need to develop the capability of the ARC to carry out more projects that involve *resource transfer to communal farmers* in addition to providing training. The capability needs to be characterised by the use of a holistic and systematic design approach in order to ensure sustainable improvement to food security, livelihood, and resilience to climate change. Enterprise engineering (EE) is a discipline concerned with the design of enterprises as artefacts. EE

considers enterprises as complex social systems and addresses the problem of enterprise misalignment caused by business decisions that do not consider the system-wide effects. The development of enterprises in an ad hoc way leads to failures in implementation of strategic undertakings. The failures have been found to be caused by misalignment between new strategic roles and the functional capabilities of enterprises (Dietz et al., 2013). Therefore, EE shall be used as the theoretical area from which techniques for solving the problem of feed shortages due to climate change shall be considered. The problem of developing an enterprise solution artefact for addressing feed shortage due to climate change, as a continuation of the project done by the ARC, is said to be an instance of a class of problems concerned with improving the adaptive capacity of smallholder farming to the negative effects of climate change especially in developing countries.

Action Design Research shall be used as the research methodology for the study as it facilitates the development of a solution artefact that is founded on a theoretical base and informed by iterative interaction and evaluation by participants of the project some of whom will be responsible for operating the solution artefact. The ARC employed a farmer participatory approach in the endeavour to identify and roll out suitable infrastructure for communal farmers. The participatory approach promotes involving the people who are going to implement a solution artefact as participants in its development in order to increase the chances of adoption and effectiveness of solution. The participatory approach was a appropriate considering that studies have shown that farmers attribute their failure to adapt to climate change to the lack of resources rather than knowledge (Mdoda, 2014).

De Vries, Van der Merwe & Gerber (2013) present a model that demarcates the enterprise into various subsystems or *design domains* that need to be designed in order to address the need for alignment between strategic intentions and functional capabilities. De Vries (2017) identify the following design domains for an enterprise artefact: *organisation; human skills & know-how; information communication technology (ICT); and infrastructure (facilities & non-ICT technologies).* The function of the organisation subsystem is dictated by the *environment* system with which it interacts and is supported by the other subsystem. Therefore, the livestock feeding operation solution to be designed for the communal farmers represents the organisation subsystem and needs to be supported by the other subsystem in terms of human skills, infrastructure, and ICT. There are several methodologies that have been developed for the holistic and systematic design of enterprises, for example, the *DEMO-based enterprise engineering methodology* (DEEM) developed by Meulen (2016) and the approach by Hoogervorst (2009). Future work will investigate which methodology will be useful during the development of a solution to address shortages of feed resources due to climate change. The purpose is to use the existing ARC project as a vehicle to demonstrate the solution.

7. CONCLUSION

The ARC infrastructure project is a great example of how cooperation between various stakeholders towards developing the adaptive capacity of smallholder farmers can achieve great gains and contribute to agricultural productivity, food security, and farmer livelihoods. This article has highlighted the deficiencies in the current practices of smallholder farmers, especially communal farmers, aimed at adapting to the shortages of feed resources caused by climate change. It is envisaged that the identified strategies and technologies employed in South Africa as well as other countries will be used to identify a suitable and effective adaptation strategy for implementation by communal farmers and will constitute an extension

of the infrastructure project of the ARC. The present study as well as future work are in keeping with the principle of continuous improvement in adaptation to climate change.

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Back to Table of Contents

THE IMPACT OF CONSERVATION AGRICULTURE ON FARMERS IN THE COMMUNAL AREAS OF THE NGCOBO DISTRICT, EASTERN CAPE PROVINCE

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Back to Table of Contents

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FIFTH SESSION.
BRINGING AWARENESS ON COMMERCIALIZING LIVESTOCK PRODUCTION IN TALENI AND SHWENI COMMUNITIES, CHRIS HANI DISTRICT MUNICIPALITY, SOUTH AFRICA

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1. INTRODUCTION

Livestock contributes to rural livelihoods and the economy of the country. Statistics of livestock production at provincial level are scant because not all farmers dip their livestock where records are kept. Communal livestock farmers are different to the commercial farmers, therefore a different approach to assist the non- commercial sector was initiated. Social issues are very important to rural livestock owners (Ainslie, 2013). Social factors affect meetings for development for example funerals. The whole community need to support a bereaved family and do minimal gardening and arable land work. Dipping days may be postponed to a bereavement in the community. This may delay dipping time at crucial days of disease outbreak. Farmers do not keep records of numbers and income generated through livestock products and sales. Farmers have their expertise of identification, as such an ox may be kept for many years with a name and a relationship to the owner. Knowledge on tender meat and classification of meat is lacking. This therefore means that awareness had to be brought forward to enhance better understanding of the commercialization of livestock. This sector needs technical support in improving quality product, nutritional and health management. Awareness campaigns could be informally and formally done by one on one or by group interactions like Field days and information days to achieve improved management of livestock. Small area of land planted forage crops led to a cow calving that was barren for two years (Mapeyi & Gumede, 2012). Hunger in winter was causing delay in fertility (De Villiers & Letty, 2001).

2. OBJECTIVES

This study addresses problems experienced by farmers in order to improve production level, numbers;
Identified opportunities through a diagnostic survey;
Bringing awareness on importance of commercialising rural livestock;
Give technical support at homestead and in a group level.

3. METHODOLOGY

3.1 Study site

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The study covered 6 communities in 2009/10 and was conducted in Ntsika Yethu Local Municipality in Jojweni, New Mine, Mangubomvu, Mangunkone, Taleni (Komkhulu) and Shweni communities under Chris Hani District Municipality. Two communities were selected from the 6 communities, Taleni and Shweni villages from October 2010 to February 2012, but more interventions occurred from 2012 to 2017. Participants owned either cattle and sheep; or cattle, sheep and goats or sheep and goats or sheep or goats only. Livestock were kept in the kraals at night before the survey until the research team arrived to count and observe livestock. Kraal visits occurred at 8:00 a.m. and latest at 9:00 a.m. All livestock in 27 homesteads were observed and counted in 2 consecutive days. As information was gathered, solutions to the problems were shared with the farmers. Awareness campaigns were informal, on one-on one basis. After the kraal visits, counting flocks and herds, the team seated down to allow the farmer to recall incidences that occurred since the previous visit. Two –way communication was allowed to address challenges and encourage progress. Farmers were encouraged to improve on quality of livestock in order to access formal markets. Regular sales were encouraged in order to assist in supplementing, maintaining good health of animals. Mobilisation through meetings, forage crops planting demonstrations and information days ran while no surveys were conducted

4. RESULTS

Farmers also shared knowledge and referrals to experts were made. Indigenous technical knowledge was being transferred through farmer to farmer information sharing sessions like meetings and Information days twice a year (Matata et.al, 2012). Trust was built between the stakeholders. Lamb survival rate increased from 40 to 70%, calving percentage increased from 50 to 65%. Survival rate of young animals was improved by correct use of medicines, use of drugs, availability of drugs, availability of advice when needed, buy in of the supplementation as the study continued. Therefore, starvation reduced from 40 to 20%, awareness to keep treatment drugs was from 30-60% the livestock numbers indicated in Tables 1, 2 and 3 below. Lamb, kids and calves survival means increase in number of herds and flocks. Starvation was reduced by awareness of the improved management crop residues. One of the newly introduced techniques was a box baler for excess grass along the cropping gardens and crop residue baling and storing while there is enough grass for later use.

Decrease in hunger reduces mortality rate in adult and young animals and to an extent of improving birth rate in pregnant animals and also survival rate on new-borns. Out of 27, only one farmer planted maize and green forage to feed livestock when the research started, but now there are additional 3 respondents planting forage crops in winter.

Table 1: Sheep owners and the numbers of sheep flock

Sheep owner	Community	Age category	2010 visit 1	2011 visit 2	2011 visit 3	2011 visit 4	2017
1	Shweni	Widower (young and employed late 50s)	25	27	34	34	36
2	Shweni	Widower (old 80s)	12	12	16	16	20
3	Shweni	Yman	22	20	26	26	40
8	Shweni	Yman	0	0	0	0	7
9	Shweni	Mman	404	414	414	505	470
11	Shweni	Widower/son (pensioner in teaching, son less 35yrs)	22	22	30	30	76
13	Shweni	Yman	33	33	38	38	45
16	Shweni	Yman	6	6	8	8	16
17	Shweni	Yman	6	6	10	16	20
20	Komkhulu	Old male	10	10	16	16	16
21	Komkhulu	Brother/daughters	26	26	30	30	22
22	Komkhulu	Old male	4	4	4	0	0
23	Komkhulu	Old male	26	26	37	37	53
25	Komkhulu	Widower	30	25	22	22	45
29	Komkhulu	Widower	41	41	45	45	61
30	Komkhulu	mfemale	14	14	18	18	26
32	Komkhulu	mMan	140	140	140	140	146
35	Komkhulu	Old male	146	146	134	134	200
36	Komkhulu	Mman	5	5	4	4	7

Yman/female= youngman/female with age 30-50
O man/female=old man/female at 70yrs and more
Mfemale= middle aged female 51-60yrs
mMan=middle aged men=51 – 60yrs

Table 2: Showing goat numbers of Taleni and Shweni villages in different homestead visits

Goat owners	Community	Age category	2010 Visit 1	2011 visit 2	2011 visit 3	2011 visit 4	2017
1	Shweni	Widow (young and employed late 50s)	14	14	16	16	3
2	Shweni	Widow (old 80s)	8	8	12	12	13
3	Shweni	Yman	16	16	20	20	30
4	Shweni	Ofemale	4	4	6	6	6
5	Shweni	Yfemale	15	15	26	26	12
6	Shweni	Yfemale	6	6	7	7	10
8	Shweni	Yman	5	5	4	4	6
9	Shweni	Mman	85	85	90	90	89
11	Shweni	Widow /son (pensioner in teaching, son less than 35yrs)	14	14	17	17	20
13	Shweni	Yman	26	26	33	33	33
16	Shweni	Yman	15	15	20	20	30
17	Shweni	Yman	6	6	8	8	12
18	Shweni	Mman	6	6	6	6	6
19	Shweni	Mman	4	4	6	6	7
21	Komkhulu	Old man	10	10	14	14	20
22	Komkhulu	Brother/daughters	16	16	18	18	24
24	Komkhulu	Oman	26	26	35	35	55
26	Komkhulu	Widow	16	16	18	18	24
30	Komkhulu	Widow	15	15	18	18	19
31	Komkhulu	M female	5	5	5	5	7
32	Komkhulu	Ofemale	4	4	5	5	5
33	Komkhulu	Oman	45	45	56	56	85
34	Komkhulu	Ofemale	6	6	6	6	7
35	Komkhulu	Oman	16	16	20	20	27
36	Komkhulu	Mman	0	0	0	0	3

Table 3: Showing cattle owners and herd sizes of Taleni and Shweni villages

Cattle	Community	Age category	2010 Visit 1	2011 visit 2	2011 visit 3	2011 visit 4	2017
1	Shweni	Widow (young and employed late 50s)	8	8	5	5	5
2	Shweni	Ofemale	4	4	5	5	3
9	Shweni	Mman	37	37	40	40	40
13	Shweni	Mman	7	7	7	7	10
20	Komkhulu	Oman	8	8	8	8	10
21	Komkhulu	Brother/daughters	11	11	11	11	11
22	Komkhulu	Oman	3	3	3	3	2
23	Komkhulu	Oman	6	6	6	5	4
25	Komkhulu	Widow	10	10	8	8	11
26	Komkhulu	Widow	2	2	1	1	0
29	Komkhulu	Widow	10	10	11	11	9
30	Komkhulu	Mfemale	3	3	3	3	3
31	Komkhulu	Ofemale	3	3	5	5	3
32	Komkhulu	Oman	7	7	7	8	8
33	Komkhulu	Ofemale	3	3	4	4	5
35	Komkhulu	Oman	12	12	12	13	18

In Tables 1, 2 and 3, Visits made end of 2011 and beginning of 2012 were excluded. Visits 5 up to 8 were excluded in the data. The age category used to hide participant's names. Widowed females that occurred during the study in all three tables showed improvements in numbers despite the wife has a hired labour or uses the family labour. Sons took care of their mothers after death of their fathers in participants numbers 11, 22 and 26. Two semi-commercial farmers tend to keep same number of animals by selling and slaughtering participants 9 and 32 in Tables 1, 2 and 3. Participant 9 is also a role model of the other farmers and had encouraged commercial farming in a rural area set up, where land ownership is risky and tough to own. The farmer lives on farming only and sells quality breeding stock. Buys rams and bulls from stud breeders to boost his heard and flock.

Both communities have small stock dipping tanks built by individual farmers which also benefited all. A sheep shearing shed was donated by the department. In all meetings farmers were encouraged to shear sheep as an association. A highly organised group is that of sheep owners, which therefore motivates co-operative formation, whilst in goat and cattle there is less motivation to work as a team. Institutional support for sale pens is slowly promoting the team work spirit. Farmers believe keeping livestock for more than 2 years old which is opposite to the commercial market, the younger the animal the better the quality and the price thereof. Better grades are from young and tender meat by South African beef classification, Cleaver Award, and Red meat Association. Cleaver Awards are for encouraging quality production and subsistence and emerging farmers will ultimately step by step or gradually buy into these standards.

5. CONCLUSION

There are a lot of opportunities out there, but inaccessible because the quality does not meet the industrial standards and perceptions that need to be pulled out on quality of meat

(Bosman, 2016). Meat quality could be improved through supplementation in winter and drought times, improving health management and hygiene of the kraals. It is perceived as impossible to plant fodder at small scale level (Mapeyi, Zondi & Gambiza, 2013), but 30sqm to 180sqm could minimally sustain a nursing sheep or goat nanny. Three cows survived the winter feed shortage in a 90sqm 1-hour grazing time three times a week.

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Back to Table of Contents

ANALYSIS OF LINKAGES, CHALLENGES AND PROSPECTS OF OPTIMISING FARMERS' GROUPS FOR COMMERCIALISING AGRICULTURE IN SWAZILAND: THEME: PARTNERS OF AGRICULTURAL EXTENSION IN DEVELOPING THE FARMING COMMUNITIES TOWARDS COMMERCIALISATION.

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ABSTRACT

The major challenges in food and nutrition security is getting and synergising efforts of partners. In Swaziland, efforts are involving partners in agricultural extension and education of small-scale farmers. This paper analysed the partners, challenges and prospects of optimising small-scale farmers' groups. The study utilised partners' policy documents; key informant interviews; focus group discussion; participant observations; and linkage and problem tree. Findings show that partners are University, research units, Ministries of Agriculture, Education, NGOs, CBOs, farmers associations, companies, farms, agricultural and ICT companies, schools, colleges and skills centres. The linkages are with those involved with (i) inputs (goods and services, technical knowledge and skills, and capital), (ii) facilitation (regulatory bodies and facilitators such as CBOs and FBOs; famers' unions, private sector and co-operatives; farmers associations, ICT units; international organisations and extension agencies); and (iii) outputs (market platforms, wholesalers / retailers and consumers).

Challenges are lack of extension prerequisite training and knowledge by partners, use of ICT-based linkages is elementary and agriculture education policy favouring youth. The opportunities are youth training in schools and colleges, agricultural policy supporting farmers' subsidy, purchase of produce and protection by extension innovation platforms or cluster approaches. Conclusions are real optimisation of small-scale farmers for commercial agriculture requires acquisition of adequate extension knowledge by partners to utilise linkages and to operate in extension service innovation platforms.

Keywords: challenges, commercialising small holder agriculture, linkages, prospects.

1. INTRODUCTION

1.1 Linkage System

Research, extension and farmers are the three main pillars of agriculture system and their effectiveness largely depends on the strong linkages among each other (Yenesew, Edo and Dereje, 2016). Stakeholder linkages are interactions among the potential partners or actors and to ensure the exchange of information, knowledge, resources or power among them in a reciprocal manner (Uma Sah, Dubey & Singh, 2014).

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The concept of linkage in extension can be domiciled within the process of development and operation of the extension principles which seeks transformation of the rural areas through development of Agriculture. According to Oakley and Garforth (1985), development involves the introduction of new ideas into a social system in order to produce higher per capita incomes and levels of living through modern production methods and improved social organization. This involves the development of three basic elements of economic, social and human development.

The definition of development and operation of the basics principles of extension as enunciated above stipulates that extension services or works cannot be provided in isolation. It has to be in mutual collaboration and cooperation with other stakeholders in Agricultural production system. Ideally and conventionally, the following stakeholders in agricultural production system could be identified in literature (Adekunle & Farinde, 2018; Kassa & Dawit, 2017): farmer groups as the target of optimization (as producers, processors and marketers' associations); research scientists who carry out empirical investigation into the causes of a problem and proffers solution to the problems; government institutions (Ministry of Agriculture, Health, Education, local government) in charge of policy design, formulation and implementation, monitoring and evaluation; support service providers (credit, inputs, infrastructures) for efficient agricultural production system; and market institutions (local , national, international markets where the wholesalers and retailers operates as shopping malls).

Linkage system model varies from one country to another. In Nigeria, it is called Research–Extension-Farmer-Input Supply Linkage System (REFILS) (Faborode & Laogun, 2008; Ironkwe, Ekwe, & Mbanaso, 2006; Faborode & Ajayi, 2015). This model is a representation of institutional dynamics of linkages between National Agricultural Research Institutes (NARIS), Agricultural Development Programmes (ADPs), farmers and input agencies (Nnadozie, Ume, Isiocha & Njoku, 2015). In Ethiopia, it is referred to as Agricultural Development Partners‟ Linkage Advisory Councils (ADPLACs). According to Kassa, Ranjan, Dawit, Abera & Jemal (2012), the contribution of ADPLACs in agricultural innovation can be viewed in terms of:

(i) creation of institutional linkages and synergies;
(ii) prioritization of existing critical challenges and their respective required interventions;
(iii) alignment of different actors and research and development endeavours; and
(iv) the creation of the opportunity for monitoring and evaluation.

According to Belay, et al. (2012), how these innovation processes have been promoted through ADPLAC and how they contributed has been demonstrated based on the selected successful innovations put in place in relation to

(i) the National Agricultural Research System,
(ii) the Enset Bacterial Wilt in the major enset producing areas,
(iii) wheat yellow rust control,
(iv) urban agriculture and its extension package.

In the operation of research-extension-farmers linkages systems in Ethiopia, Belay & Dawit (2017) found that there was a gradual improvement with increased types and mechanisms of the research-extension linkage in recent years that are related with

(i) institutional linkages of actors of the National Agricultural Research System (NARS) with actors of formal agricultural technology delivery systems,

(ii) technology demonstration and popularization promoted by the NARS in collaboration with MoA and Regional Bureaus of Agriculture (RBoA),
(iii) Farmers' Research Groups (FRGs) approach promoted by the NARS in collaboration with MoA and RBoA,
(iv) Technology specific special pre-extension activities promoted by the NARS,
(v) Publications made available by the NARS, and
(vi) Agricultural Development Partners' Linkage Advisory Councils (ADPLACs) as research-extension linkage platforms.

In Zimbabwe, there are no organised farmer-research-extension linkages. Only low-level informal networks exist between farmers and extension officers. The frequency of communication and communication channels used by the extension, research and farmers does not support or indicate any formal structural linkages among them (Nyamupangedengu, 2015).

In South Africa, there are structures of formal linkage system among stakeholders in agricultural production system though need further promotion as noted by the Department of Agriculture, Forestry and Fisheries (DAFF, 2009) that collaboration between stakeholders need to be promoted in order to focus on innovation and adaptive research. According to Modirwa (2014), South African government has prioritised support programmes such as the Comprehensive Agricultural Support Programme (CASP), the Land Redistribution for Agricultural Development (LRAD) and the Micro-Agricultural Finance Initiative of South Africa (MAFISA) in order to enhance agricultural performance. Modirwa (2014) noted that agricultural production system in the North West Province consists of the Agricultural Research Council (ARC), which represents the research sub-system, farmers' producer organisations, agricultural input dealers, marketers, the directorate of extension services in the department of agriculture, forestry and fisheries which provide extension services for farming communities, the North West University, Faculty of Agriculture, Agribusiness and other Agricultural Research Institutions. It is from all these stakeholders that linkage activities are coordinated and agricultural decisions made.

In Malawi, there is a robust agricultural extension system called District Agricultural Extension Services System (DAESS) supported by networks of other stakeholders. DAESS is a mechanism for enabling farmers to identify and organise their agricultural felt needs for appropriate action by relevant stakeholders. The District Agricultural Extension Service System is integrated into the District Assembly system through two structures known as the Stakeholder Panels and the District Agricultural Extension Coordination Committee.

The objective of the DAESS is to empower farmers to demand high quality services from those that are best able to provide them (Malawi MoA, 2006).

Agricultural extension in Swaziland has transformed from the Colonial British dominated system to a 100% Swazi localised Extension System. Furthermore, different systems of Agricultural Extension have been tried and abandoned. Currently, efforts to employ a more participatory approach have been initiated. However, due to the slow operation of Government, the process of full adoption of the participatory method of extension delivery mode is taking time. This is reflected in the many policies some of which have not been implemented. Criticisms of Agricultural Extension in Swaziland include
(i) weak link between Agricultural Extension and partners including research;
(ii) weak links between Agricultural Extension and the various units of the MoA;

(iii) officers, especially front-liners have certificate to diploma qualification (73%); and
(iv) infrequent in-service training of officers.

Agricultural Extension was formally organized in 1930 as a service and is the core responsibility of the Ministry of Agriculture (MoA) (Trail, 1985; MoA, n.d). The core partners of the MoA in the delivery of agricultural extension services are

(i) Department of veterinary services and
(ii) Department of Agriculture Promotion and Extension (MoA, n.d).

Other departments of the MoA are:

(i) Administration, which oversee finance and human resources;
(ii) Department of Agriculture Planning and Analysis;
(iii) Department of Land Use Planning and Development and
(iv) Department of Agricultural Research Specialist Services.

In addition to these departments are parastatals or public enterprises under the MoA which play key functions in the delivery of agricultural services. These include:

(i) National Agricultural Marketing Board (NAMBoard);
(ii) National Maize Corporation (NMC);
(iii) Swaziland Water and Agricultural Development Enterprise (SWADE);
(iv) Swaziland Diary Board (SDB); and
(v) Swaziland Cotton Board (SCB).

1.2 Policy analysis on linkages, challenges and opportunities to optimise farmers groups in Swaziland

The analysis of the Comprehensive Agriculture Sector Policy [CASP] (2005) reveals that the Agriculture sector in Swaziland has been compounded by inadequate infrastructure and little investment in the rural areas. Also, the agricultural sector, in particular rain-fed crop production, is vulnerable to recurrent drought due to changes in global climate patterns. The current rate of HIV prevalence also has enormous implications on the development of the agriculture sector and its capacity to contribute to economic growth. The chronic drought has led to water shortages resulting in death of animals and crop failures. Other challenges faced by the agriculture sector include widespread soil erosion and land degradation, lack of agricultural land and isolation from markets, limited income generating opportunities, gender restrictions for women to access land and resources, and lack of implementation of appropriate policies. Therefore, specific objectives of the CASP are to:

(i) increase agricultural output and productivity;
(ii) increase the earnings for those engaged in agriculture by promoting adoption of diversification and sustainable intensification and use of appropriate technology
(iii) enhance food security
(iv) ensure sustainable use and management of land and water resources and
(v) stabilize agricultural markets.

The policy seeks to achieve these objective through a number of strategies that include the following: adoption of sustainable rain-fed cropping systems and management practice; exploring dry lands and adoption of drought tolerant crop varieties; enhance mechanization of rain-fed agriculture; production of cotton be financially and technically supported; productive and healthy watersheds be established and sustained; improved communal grazing management and sustainable utilisation of the rangelands be introduced and promoted;

agricultural research be strengthened and focused on identifying major bottlenecks to agricultural productivity and on generating improved and appropriate technologies; more efficient and comprehensive extension services be provided to the farmers; market systems and infrastructure be developed and that access to local and export markets be improved; and smallholder access to credit be improved.

The National Development Strategy [NDS] (1999) highlights the need to raising the capability of the agricultural sector to generate a higher volume of goods and services for given factors of production, without destroying the environment. It emphasizes the importance of food security at the household and community levels, commercialisation of agriculture on Swazi Nation Land, efficient water resource management and usage, and rational land allocation and utilization. The Poverty Reduction Strategy and Action Plan [PRSAP] (2005) was put in place with an aim to reduce poverty especially in rural areas and commercialise the smallholder agriculture in the country. Also, in order to realize the NDS, the Prime Minister's office launched the Smart Programme on Economic Empowerment and Development (SPEED) in 2004. This initiative was aimed among others achieving food security through increasing agricultural production, increasing the maize and cotton production, improving veterinary and livestock services, and maximising land use planning.

The National Food Security Policy (2005) addresses the threats and opportunities related to food security in Swaziland. Food insecurity is identified as a major challenge for agriculture sector. The policy is set around the four key pillars for food security: Pillar 1: Food Availability; Pillar 2: Food Access; Pillar 3: Food Utilisation and Nutritional Requirements; and Pillar 4: Stability in Equitable Food Provision. The policy seeks to improve farm productivity through improved farm operations and mechanisation; make all efforts to mitigate the impact of HIV/AIDS on food production; to support maize production to improve household food security; and to diversify and support sustainable animal production to enhance food security

A draft National Land Policy (NLP) was prepared in 1999 aimed at improving access to land and security of tenure on Swazi Nation Land (SNL) including tenure on irrigation schemes, as well as clarifying roles and responsibilities for land administration. The draft policy considers the possibility of leasehold arrangements and transferable user rights for individual farmers and farmer groups using the 99-year leasehold concept on SNL. The National Irrigation Policy seeks to optimise farming through the efficient use of water resources in a bid to realise commercial farming.

The goal of the Livestock Development Policy [LDP] (1995) is to achieve an efficient and sustainable livestock industry contributing to economic development. The policy leads to the Livestock Identification Act of 2001 which makes a provision for the compulsory marking of livestock with registered identification marks with aim of combating livestock rustling.

The National Agricultural Summit in 2007 revealed that the public institutions' capacity to deliver essential services to develop smallholder farmers was wanting in several aspects such as research extension linkages; research-based technologies, knowledge and innovation. Therefore, the National Agricultural Research Authority (NARA) of 2012 was implemented with the goal to make agriculture effective, efficient, relevant and demand driven. The NARA was established among other things as mechanism for establishing and operationalizing linkage and linkage mechanisms amongst different stakeholders including farmers' organisations, agricultural extension and education, Faculty of Agriculture

(UNISWA), producers and processors; to establish and institutionalise coordinated and sustained research funding management systems which can accept resources from both public and private sectors; to establish mechanisms for the capacity development of all service providers and value chain actors including farmers and farmers' organisations, extension service providers, NGOs, Agricultural education and all other stakeholders, public and private sector organisations and institutions requiring particular knowledge and skills to provide level playing fields for all and thereby improving stakeholder interactions; to establish a dynamic and well-integrated information management system that promotes utilisation and ensures continual use by all stakeholders; to increase investment in agricultural information and knowledge systems to cover capacity building in ICT and infrastructure for receiving and disseminating information to regions and rural development areas; and to collaborate with Swaziland Standard Authority [SWASA] to establish quality standards for different food products and promote product development and innovations that add value to different agricultural products in accordance to the value chain demands.

This study aims to investigate the existing linkages, challenges and opportunities within the informal contacts among stakeholders (who could be partners to agricultural delivery system) in Swaziland agricultural production system with the sole aim to proposing a model of formal linkage system for optimizing farmers' groups to becoming entrepreneurs in Swaziland.

2. OBJECTIVE

The paper analysed the partners, challenges and prospects of optimising small scale farmers' groups.

3. METHODOLOGY

The study utilised partners' policy documents; key informant interviews; Focus Group Discussions; participant observations; and linkage and problem tree.

4. FINDINGS

4.1 Partners

Both the Key Informants' Interviews (KII) and the Focus Group Discussion (FGD) conducted established that partnership was based on the mutual benefits to be derived in the relationships inform of collaboration for technical, managerial, input and advisory service and which are mostly social and economic in nature. The social values are always a means to the economic values. For example, the farmer who represented National Agricultural Marketing Board (NAMBoard) in the FGD said that *"NAMBoard is an Association of farmers that searches and organises market for agricultural producers and products in Swaziland; networks with Market Organizers, Manzini Central Market Place, Food Vendors, and Shopping Malls for marketing of farm produces; Input suppliers e.g. Swaziland Agricultural Input Supply Company, Farm Chemicals – input supplier; Extension Officers – extension service providers; Community people for labour; ICT companies for communication and information sourcing and storage; Technical Skill Centre for recruitment of youth trainees for farm employment; Teacher Training Colleges; Eden Engineering for mechanical services on the farms.*

Partners for Siteki Industrial Training Centre (SITC) are Mpisi Farm; Mabhuda Farm; Bosco Youth and Agriculture Centre- Training of youth; NAMBoard and Vendors. Nhlangano

Agricultural Skill Training Centre (NASTC) also partners with Ministry of Agriculture, Rural Development Areas (RDAs) and Individuals. ACAT partners mainly with the MoA-Agricultural Extension and others like NGOs viz. National Maize Corporation (NMC), NAMBOARD & World Vision; traditional leaders and entire communities perhaps for project intervention. MoA networks on permanent basis with many partners; viz NGO's: ACAT, World Vision, NAMBOARD, SNAU, Swazi Bank, NMC, FAO SWAFCU, and Agricultural Research Division. Vuvulane Irrigation Association networks as follows: Farmers at the then Vuvulane Irrigation Farms have partnered with Mhlume Sugar Mills (RSSC) and Swazi Bank. The links are anchored in farm credit and security (surety by RSSC). RSSC purchases farmer's produce (Sugar cane mainly). Swazi bank provides farm loans (credit) to the farmers and RSSC stands as surety for the farmers while Swazi Bank provides Extension Services.

Swazi Bank partners with Sugar Commodity Millers, Swaziland Sugar Association Sugar Commodity Millers, Swaziland Sugar Association, Sugarcane growers' associations, Swaziland National Agriculture Union (SNAU), *Ministry of Agriculture / Extension services.* Sugar Commodity *Millers* include Lubombo & Royal Swaziland Sugar Corporation (RSSC) – market for sugarcane; provide extension service on sugar cane production, and assist on management of sugar cane community projects / schemes / associations; Swaziland Sugar Association with offtake of the sugar and selling it outside the country; regulation of seeds, chemical (i.e.herbicides & pesticides) and fertilisers; Sugarcane growers associations [farmers groups] as mouth piece for the farmers. For instance, negotiate on behalf of the farmer against electricity hikes, soliciting capital (with the European Union); SWADE for establishment of farmers' groups in the Lowveld, Siphofaneni by surveying soils, sourcing water, providing farmer groups' training on cooperatives, possibility of resettlement and choosing management committees, linkage with the Ministry of Agriculture, monitoring of projects. Also introduce the people to the banks; Swaziland National Agriculture Union (SNAU) as mouth piece for farmers on agricultural related issues including commodities – collaborate with other association outside the countries e.g. SACAU, source funds or grants on behalf farmers and negotiate for low loan interest rates from the banks, Swazi bank as a development bank comes in as financer in the tripartite arrangement (financer, farmer and market); and Ministry of Agriculture / Extension Services provides technical advice for farmers. Also link farmers with the markets and work to assist farmers surmount challenges. Other partners are World Vision – direct Swazi Bank to farmers groups that should be funded, Youth fund - direct Swazi Bank to farmers groups that should be funded, NAMBoard – vegetable market, Umbuluzi Poultry processors – Market for poultry, Swaziland Meat industries - market for meat, Parmalat – market for milk and related products. All payments are made through the bank. This finding shows that Swazi Bank as development bank mostly networks with partners that engages in agricultural production system in the production, processing and marketing. It roles in farmer optimization in Swaziland cannot be overemphasized

The Swaziland Youth Fund networks with many partners which include

(i) Markets: National Maize Corporation for the grains (maize & beans), Swaziland Meat Industries / Wholesalers, Parmalat, Millers [sugar industries] and NARMBOARD. Others include

(ii) Input suppliers: Farm chemicals, Swaziland Agricultural Supplies, Khuba traders, (iii) Farm mechanization units: Agric. mechanization, farm traders;

(iii) Expertise / extension providers: Ministry of Agriculture and Cooperation, Input Suppliers, Swaziland Agricultural Supplies, and Veterinary officers. Youth Fund also partners with
(iv) Facilitators OR Business Development Agencies - linking farmers to farmers and service providers: SWADE, World Vision Swaziland, ACAT, Technoserve, Lulote, RSTP, SEDCO – Graduate Enterprise Programme, Central Bank – Guarantee Scheme. EBDC @ Kwaluseni Campus, Swaziland Breweries – Kick start programme selectin 60 young people every year for training. These are important as a majority of the farmers are illiterate and cannot look for help. Youth Fund partners with
(v) Processors [before market] for specific package – abattoirs and, maize millers although Swaziland is not much into farm processing; Financers as Youth fund and Swazibank must have a developmental mentality and mandate. According to the Youth Fund KI, Financers are mainly Development Financing Institutions (DFI) and commercial banks. DFI make sure that farming performs as they focus on the production aspect of farming while Commercial banks are into processing and need security or collateral;
(vi) Production: Commodity groups are better than associations e.g. maize, legumes, livestock [dairy, piggery, poultry (layers / broilers), fresh produce (vegetables & fruits or baby vegetables); and
(vii) Ministry of Agriculture and World Food Programme: on policy formulation and advocacy.

From the findings above, it is apparent that each partner's number of partners is a reflection of how influential and how valuable the respective roles are to enhancing food and nutrition security particularly in promoting human empowerment, resource development, and food and fibre production based on commercialization, diversification and intensification of agriculture. NAMBOARD, SITC, MoA, SwaziBank and Youth Fund seem most prominent in terms of chains of partners. Their roles would facilitate and enhance optimization of farmers' groups if well-coordinated through the establishment an active strong and dynamic structural linkage mechanisms in Swaziland.

4.2 Linkages

Linkages employed by the partners are mainly phone calls, farm and office visits, group meeting, farm training, school/classroom lecture/training, email, internet surfing and websites. Other linkages include circular letters, technical reports and workshop. These linkages are based for effective performance of partners' roles in ensuring optimization of farmers' groups.

Focus Group Discussion revealed that there are many institutions, organizations and farmers groups that are directly and indirectly involved in the production of food and fibres in Swaziland. Educational Institutions like the University of Swaziland, Faculty of Agriculture, William Pitcher and Ngwane Teacher Training Colleges translate agricultural policy into curriculum to develop manpower resources in Agriculture as agricultural teachers, farmers, and administrators. Vocational Resource Centre like Siteki Industrial Training Centre (SITC) provides entrepreneurial knowledge and skills to empower the out of school youth who later takes career in Agriculture. SITC also provides platform for consumers in terms of area of interest and thematic areas of training given to the youth such that the youth are relevant and employable.

Farmers are producers and trainers on individual and group basis. According to one of the discussants: *"our major roles as farmers is food production ensuring that the nation is being fed, fill gaps of meeting market demand of different foods and also make profit, make use of different sectors such as Information Communication Technology, Banks and Training Centre and shopping malls as market outlets for effective and efficient production of food and fibres" (A farmer).*

Other institutions include market outlet such as Shoprite which avails farmers' produce to the public consumers; the Faith-Based Organization (African Christian College) is involved in the production of agricultural products and training of youth to specialise in any agricultural enterprise either in crop, livestock and vegetable production.

The key informant interview findings also corroborated the above information that different organizations play significant roles directly or indirectly in the production of food and fibres in Swaziland. The following are the excerpt from the Key Informant Interview:

(i) "Our role is education of the entire household or selected family members in order to achieve food security" (ACAT)*;*

(ii) "Production of sugar cane (commercial level) and other garden crops- viz. green maize, sweet potatoes and vegetables" (Vuvulane Irrigation Association)*;*

(iii) "Conduct research in the various subject matter areas of Agriculture such as crop, livestock, horticulture, biosystems and mechanization, agricultural education and extension, agricultural economics, farm management and agribusiness, disseminate research output for uptake by end-users, interact with farmers to solving their farm problem and also advise farmers and MoA on agricultural development programme for implementation informally" (UNISWA Research Centre)*;*

(iv) "Funding of clients from individual to group farmers / association / companies, Direct the farmer to service providers in farming such as soul analysis and finance Sugarcane, vegetables and banana production as the best farming enterprises" (SwaziBank)*;*

*(v)" Provide finance for agri-business and enhance the viability of agricultural business, provide technical expertise on how to produce, provide capacity building on how to run and manage funds and record keeping, and assist to improve value chain – to recapture" (*Swaziland Youth Fund)*; and*

(vi) "*Achievement and maintenance of an efficient and sustainable agricultural sector that ensures national and household food security and sustainable growth of Swaziland's agriculture and national economy, with equitable wealth distribution throughout the value chain; and to transform Swaziland's agricultural production system from its prevailing subsistence mode to a more commercially oriented production system and ensuring the attainment of Food security" (Ministry of Agriculture).*

These findings show that there are many partners which are referred to as stakeholders (Yenesew, Edo and Dereje, 2016; Uma, Dubey and Singh, 2014) in Swaziland agricultural production system that have been interacting informally playing the enlisted roles without any supervision and monitoring. The implication is that the existing structures need to be formalised with strong and active linkage system, that usher in effective collaboration and cooperation for proper understanding, equitable distribution and judicious use of resources. The linkage system can only be established if there is active, robust and well-funded extension delivery service system with legal backing at the centre to operate the linkages.

4.3 Challenges

The challenges encountered in the operation of the linkages among partners are many and diverse. The problem tree analysis classified them as Institution, farmer, market, ICT and infrastructure related problems:

4.3.1 Institution related Problems:

(i) bureaucratic bottle necks or red tapes in the procedures of processing paperwork and lack of commitment on the part of Ministry staff, it takes longer time for approval because of negative attitude and market demands;
(ii) there is attrition in the government institution (e.g. MoA) not replacing dead or retired staff;
(iii) no specialised extension services agency;
(iv) research not responsive to farmers' priority needs and there is low research output;
(v) lack of prerequisite knowledge to address climate change and no means to address like the European countries – LUSIP & KDDP;
(vi) education system does not fully support entrepreneurship or agribusiness; and
(vii) lack of linkages and collaboration between and among formal institution.

4.3.2 Farmer related problems:

(i) communication gap between farmers and marketing partners (e.g. Shoprite) on demand and supply and for the fact that farmers decide on crop to produce alone leading to over production;
(ii) farmer being price takers has negative attitude towards cultivation of crops not popular to Swazis such as baby vegetable;
(iii) inconsistent with production and supply of farm produces;
(iv) poor coordination of what is produced and what is needed by famers; and
(v) only 20% of youth are in agriculture, farmers are old and the youth have no access to land.

4.3.3 ICT and Infrastructure related problems:

(i) lack of information on websites to use for market surveillance and analysis;
(ii) lack of warehousing for processed produce and surplus;
(iii) rural roads are bad and transportation of farm produces from rural areas to reach market are long; and
(iv) lack of financing institutions without collateral for loan and lack or no value addition.

4.3.4 Community related problems:

(i) disputes over land ownership and demise of head of the family leaving behind family feud, may hinder diversification and investment in agribusiness and or optimization process;
(ii) climate change resulting in shortage of water (drought) for both rainfed and irrigation farming;
(iii) youth reluctant to take over land upon parents' demise because of lack of interest in agriculture;
(iv) no farm shed where farmers can store their farm inputs and
(v) Lack of guaranteed farm-input supply stores.

4.3.5 Credit related problems:

(i) low skilled/ uneducated / ordinary people as members of farmers association that lacks prerequisite financial skills in agribusiness;
(ii) self- interest or squabbles and high pervasive free gift syndrome;
(iii) lack of business concept and poor record or book keeping; and
(iv) dishonest and misappropriation of funds by people;
(v) agriculture needs huge investment and financial institution consider agriculture risky thus need a collateral;
(vi) lack of culture to prioritise loan repayment among farmers; and
(vii) insurance companies reluctant to insure agricultural produce because most are perishable produce.

4.4. Opportunities

Both FGD and KII revealed the following opportunities
(i) specialisation of farmers on single crop and get market contract, i.e. commitment with buyer;
(ii) diversification and intensification of agribusiness;
(iii) ICT uses to create platforms to connect with buyers beyond the country e.g. website;
(iv) group formation by graduates to produce crops or identify business idea in agriculture;
(v) availability of government e-platforms or e-government to 'short-circuit' the bureaucracy;
(vi) availing information through popular media platforms e.g. Newspapers and Radio;
(vii) strong and active demand driven extension delivery system;
(viii) emerging new markets in and out of Swaziland with better prices out of SD; and
(ix) minimise production costs and maximize productivity and use ICT to get best prices;
(x) collaboration and networking with other farmers;
(xi) harmonizing approaches across partners and developing a common approach to communities;
(xii) review of existing policies and formulation of new ones;
(xiii) constant introspection of service providers;
(xiv) Articulating pathways to linkages and linkage mechanisms;
(xv) National Agricultural Summit key to creating a forum in which farmers can share their views on food production and commercialization;
(xvi) adoption of a participatory approach in conducting Agricultural Extension;
(xvii) emphasis on value chain in agricultural production.
(xviii) establishment of own farm stores and ware houses for agricultural input (order in bulk-hence, purchase in reasonable prices) to get discount and reliable supply of farm inputs;
(xix) government offers land (idle land) to the farmers to grow food crops on large scale;
(xx) reduce risk- resources can be put together and partners can work in collaboration and can jointly negotiate for input or prices to reduce production costs;
(xxi) the policy for declaring disaster by the state such as drought needs re-visitation as it takes a long time for the ministry / government to declare a disaster, yet it directly affects the financing of agriculture;
(xxii) a need for linkages between the Ministry of Industry and Trade, Regional Administrators to resolve conflicts;
(xxiii) maximize linkage and networks e.g. researchers and financers and leverage on existing programmes, financial resources and youth / farmers programmes; and

(xxiv) provide tripartite between the markets, farmer and financers which enhance the repayment of loans. Reduce chances of loan non-repayment. Business development adviser can watch on the produce and liaise with the financers when it is ready.

4.5 Strategies for linkage mechanisms

The following strategies were arrived at from both FGD and KII:

(i) specialisation of farmers and farmers' groups on aspects of production, processing and marketing taking advantage of E-platforms, consider alternative energy solar/wind to manage SEC tariffs and developing contracts with markets;

(ii) role of extension officers must change or modified to include industrial extension and management of farms enterprises;

(iii) establishment of data base on production, processing and marketing of agricultural commodities in Swaziland;

(iv) system of agricultural production must change to tunnel and green houses and farmers must demand from retailers what they need (extension role) and identify the passion among the people as to what to produce;

(v) harmonize approaches to the community in order to leave no shadow behind, harmonize expectations and plan together for a given community;

(vi) employ constant consultative meeting and continuous assessment of farmers' priority need with a formal linkage arrangement.

4. 6 Proposed partners for formal linkage mechanism in Swaziland

Major partners regarded as core Partners by the FGD and KII participants because of their perceived roles in optimising farmers groups are: MoA, Input supply units, NAMBOARD, Research Division, RSSC and Swazi Bank. The minor partners included Traditional leaders, NGOs and community at large., Agricultural credit providers (Bank), International units (FAO, Centre for Coordination of Agricultural Research and Development in Southern Africa [CCCARDESA]), University especially Faculty of Agriculture (Human resource development & Research), small customers from the neighbourhood and vendors who purchase green maize and sweet potatoes coming from the cities of Swaziland. These partners were then classified further as

(i) Regulatory bodies,
(ii) Private & International Organizations,
(iii) Marketer – wholesalers & retailers,
(iv) ICTs,
(v) Extension Delivery System,
(vi) Educational institutions,
(vii) Consumers,
(viii) Farmers,
(ix) Government,
(x) Research, and (xi) Service providers.

The farmer / farmers' group model (Figure 1) for optimising farming for commercialisation depicts three phases involved: input phase, facilitation phase and output phase. Input phase consists of three components: goods and services, technical knowledge and skills and capital. Farmers or farmers' group need appropriate information at this phase in order to optimize commercialization. A number of role players are involved at the facilitation phase: regulatory bodies; facilitators such as Community Based organizations (CBOs), Faith Based

Organizations (FBOs), Famers' Unions such Swaziland National Agricultural Union (SNAU), private sector and co-operatives, such as Swaziland Farmers' Cooperative Union (SWAFCU); farmers associations, Information and Communication Technology (ICT); international organizations such as Food Agriculture Organization and World Food Programme (WFP) and extension agencies. The output phase consists of the market platforms, wholesalers / retailers and consumers. Farmers' groups need appropriate information on what to produce and sell. The flow of information from the input-farmer-market encourages practice of crop diversification; engaging in innovation and intensive farming, playing a vital role in optimising the farmer groups towards commercialisation.

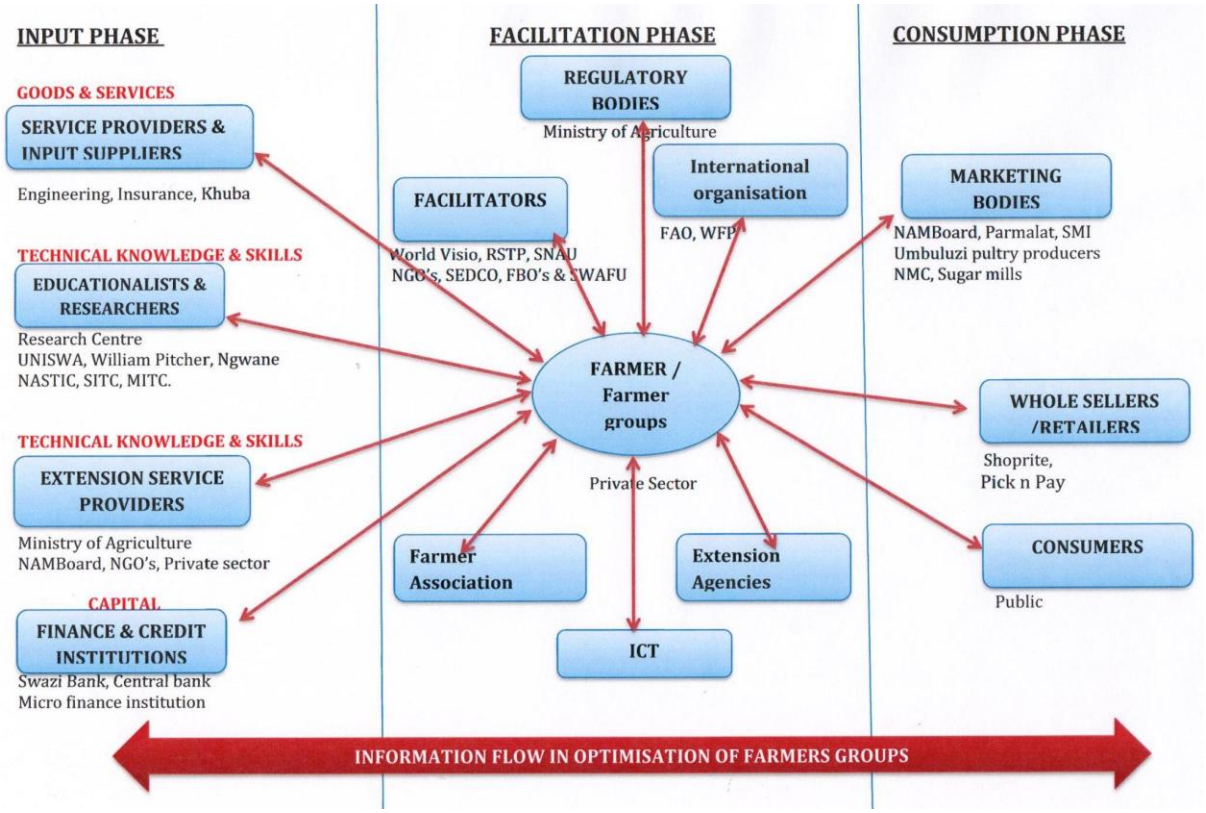

Figure 1: Farmers' group model optimisation model

5. CONCLUSIONS AND RECOMMENDATIONS

Linkage mechanisms that are needed today in Swaziland have to address specialisation of farmers and farmers' groups on aspects of production using E-platforms; changing roles of extension officers; database establishment on the value chains; changing farming systems to adapt with climate change; and harmonising approaches and relationships making formal arrangements necessary. Partners must strive to make opportunities available for linkages to happen as a matter of necessity and not as a chance.

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Back to Table of Contents

FARMER'S PERCEPTION ON THE CAPABILITY OF EXTENSION AND ADVISORY SERVICES IN PROMOTING RURAL ECONOMIC DEVELOPMENT IN INTSIKA YETHU LOCAL MUNICIPALITY.

Mtamzeli, N.[53]

ABSTRACT

Intsika Yethu Local Municipality is based in Chris Hani District in Eastern Cape. It is rural community populated with 99% blacks. Unemployment rate is very high such that the youth has fled to urban areas in order to seek better employment opportunities. Agriculture is one of the dominating sectors in the municipality. The study therefore seeks to investigate whether Extension and Advisory service have a role to play in improving rural livelihoods? The purpose of the paper is to evaluate the impact of Extension and Advisory Services in rural economic development.

The data was collected through of 50 farmers of different enterprises or commodities across Intsika Yethu Local Municipality. 25 farmers of the farmers are participating in Department of Rural Development and Agrarian Reform (DRDAR) grant programmes and the other 25 farmers are those who have not participated in any DRDAR grant programmes. Farmer believed that production cannot be improved without the intervention of government grant. Farmers also noted that lack of funding from government was a hindering factor in making extension services effective.

1. INTRODUCTION

1.1 Background of the study

Agricultural extension is a system of providing the necessary knowledge and skills on agronomy in rural communities with the purpose of maximising production, income and improving livelihood (La Grange *et al.* 2010). It deals with optimising farm production, providing market of agricultural produce and improving rural livelihoods through generating of income (Murray, 2007). It is also a tool that government uses to liaise with farmers (Zwane, 2014). The objectives of extension in an area must be in line with the socioeconomic status of that place. Agriculture extension in the 21st century is a tool for agricultural development and is necessary to increase food production and also alleviate poverty (Magoro & Hlungwane, 2014).

Intsika Yethu Local Municipality is based in Chris Hani District in Eastern Cape. It is rural community populated with 99% blacks. Unemployment rate is very high such that the youth has fled to urban areas in order to seek better employment opportunities. Agriculture is one of the dominating sectors in the municipality. According to CHDM Feasibility Study Report (2013) Intsika Yethu has a vast land that is suitable and has potential for agriculture production. The study therefore seeks to investigate whether Extension and Advisory service has a role to play in improving rural livelihoods?

1.2 PURPOSE OF THE PAPER

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Evaluate the impact of Extension and Advisory Services (EAS) in rural economic development.
Assess the role that EAS is playing in addressing socio-economic factors of rural areas.
Investigate farmer's perception on the role of extension and advisory services in rural areas.

2. METHODS (DATA SOURCES)

The data was collected through of 50 farmers of different enterprises or commodities across Intsika Yethu Local Municipality.

25 farmers of the farmers are participating in Department of Rural Development and Agrarian Reform (DRDAR) grant programmes and the other 25 farmers are those who have not participated in any DRDAR grant programmes.

Below are the categories in which the participants fall under:

Table 1: Categories of farmers.

AGE	18-35	35-60	60 & above
No of participants	8	16	26
AGE	18-35	35-60	60 & above
Employed	2	9	
Unemployed	6	7	26 pensioners

3. RESULTS & DISCUSSION

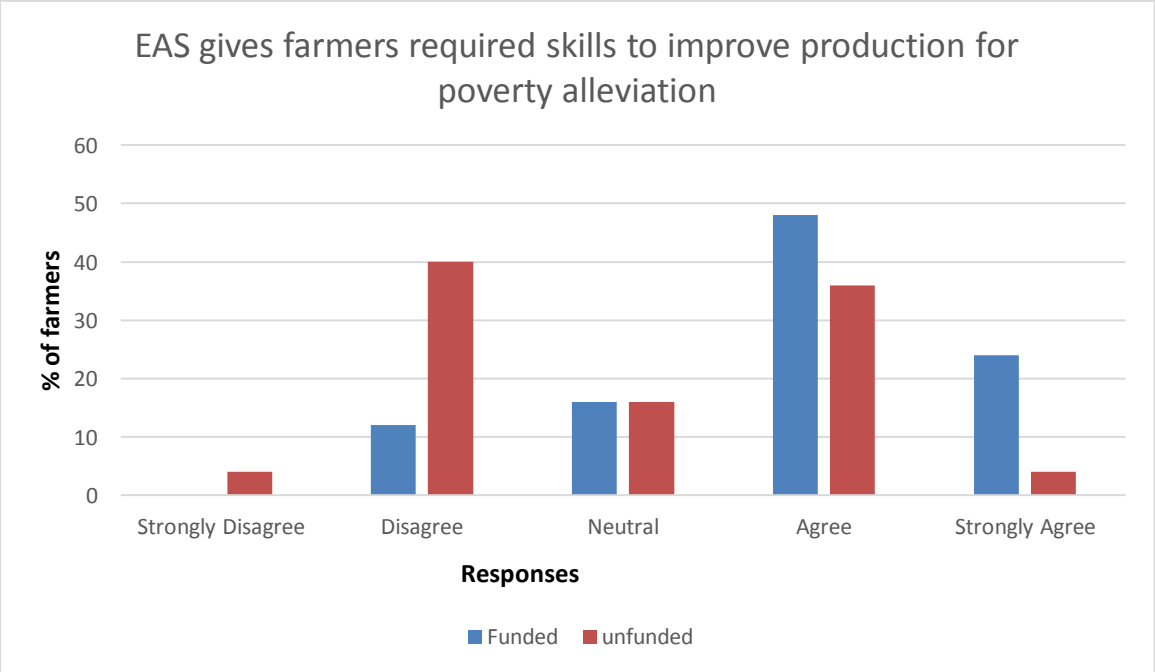

Figure1: Representing the response from farmers concerning skills received through EAS.

More funded farmers (48%) agree that EAS give farmers required skills to improve production for poverty alleviation, this is because proper extension assistance can channel efficient platform for information sharing (Lukhalo, 2017). However, the majority of unfunded farmers disagree that EAS gives farmers the required skills to improve production for poverty alleviation. Farming knowledge and skills are critical in improving productivity, thus when research has been done transfer of knowledge is imperative (Lukhalo, 2017).

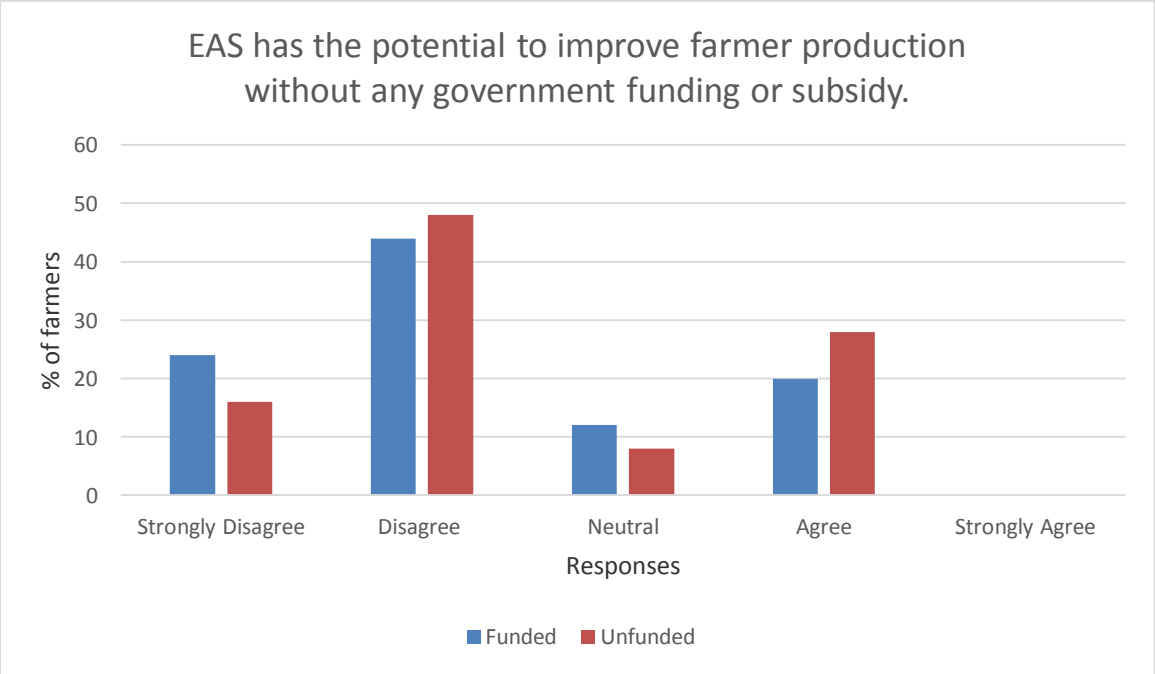

Figure 2: Responses concerning the potential of EAS to improve farmer production without government subsidy.

Farmer perception is that productivity cannot be improved unless government assist farmers with grant / funding. This is due to the high unemployment rate in the area (IYM IDP, 2017). Farmers in the area lack financial capacity to improve production, Moreover Magoro and Hlungwani (2014), notes that agricultural extension sustainability if political support and budget is made available. This perception might be due to the fact that EAS in South Africa is mostly administered by government through the Department of Agriculture.

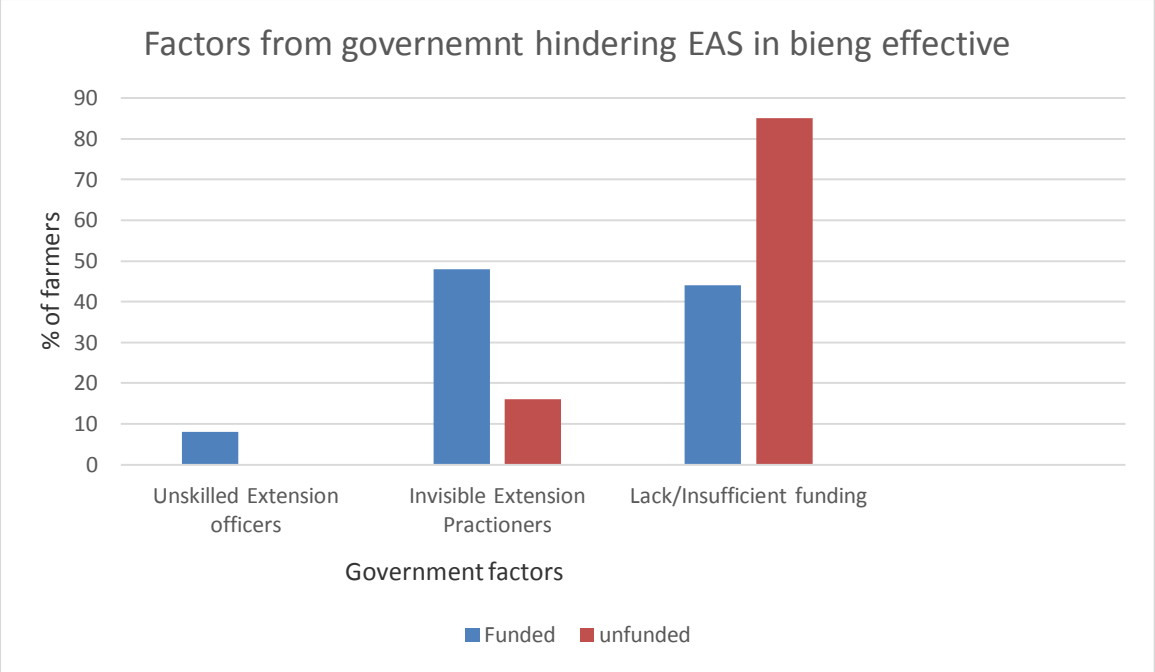

Figure 3: Responses concerning factors hindering government EAS in being effective.

Lack/ insufficient funding to farmers is most hindering factor that EAS have, for most of the farmers.

Unskilled extension officers were not a hindering factor in making EAS being effective.

The dominating factor was insufficient funding as well as invisibility of on-field extension practitioners. Due to high demand of extension officers by farmers, it is a challenge for extension officers to adhere to the extension to farmer 1:500 ratio. Extension officers are few in number versus the number of farmers they are serving (Murray, 2007; Lukhalo 2017). Such that it makes it difficult for them to be visible to farmers and meet their maximum expectations.

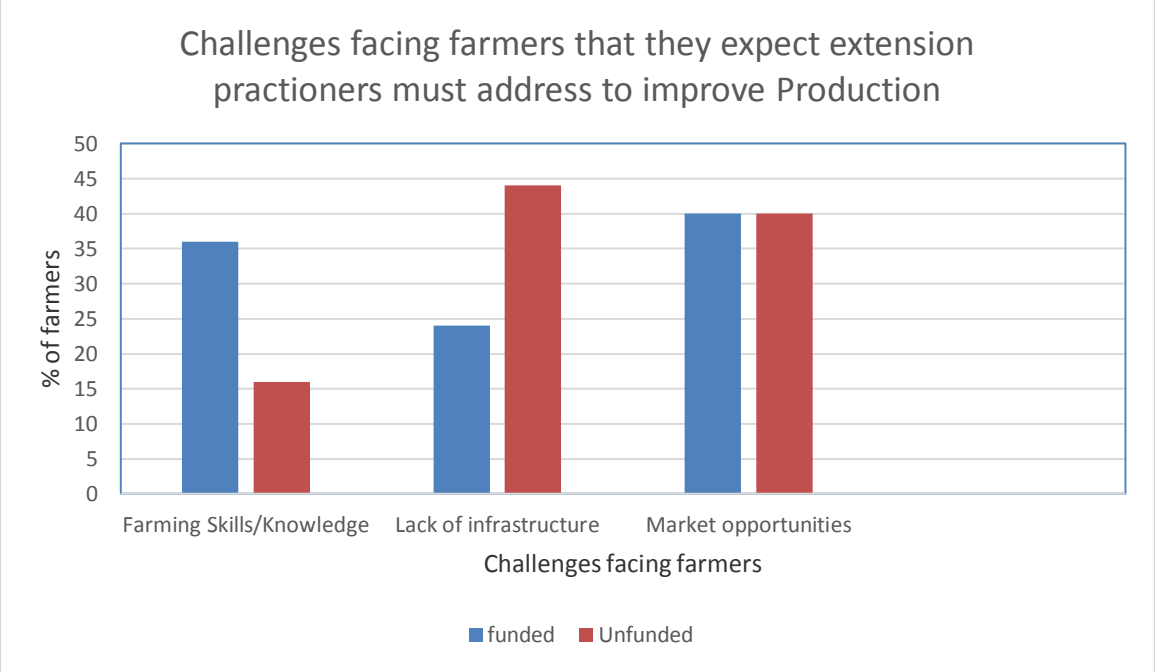

Figure 4: Graph representing challenges facing farmers that they expect extension practitioners must address to improve production.

Unfunded farmers believe that lack of machinery / infrastructure hinders that from improving production and generating more income.

However funded farmers believe that market opportunities are a challenge that they perceive extension practitioners can address so that they can generate more income through their agricultural produce. Majority of these farmers are old and are not very literate. Access to information that is based on market and its related issues may be a challenge. Extension officers now have access to internet and can be useful to farmers in rural areas in finding information (Makapela, 2015).

4. CONCLUSION AND RECOMMENDATION

Farmer's perception is that EAS has little impact in the area in maximising production. This calls for extension practitioners to make it a point to transfer technological innovations to farmers.

Government should prioritise resources e.g. vehicles to extension practitioners especially in areas where Agriculture is a dominating sector. Moreover, fill the Extension Officers' vacancies to capacitate officers for the 1:500 ratio.

The lack of capital makes farming in rural areas a challenge, thus farmers needs to be directed to other relevant stakeholders other than government to assist them with capital.

The introduction of an Agripark in the municipality will address the challenges of marketing of the agricultural produce. Extension practitioners must assist in making sure farmers benefit from the initiative.

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Back to Table of Contents

COMMERCIALIZATION OF SMALLHOLDER GOAT PRODUCERS THROUGH EXTENSION PARTNERSHIP INTERVENTIONS IN MSINGA

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Back to Table of Contents

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EVALUATION OF SIYAZONDLA FOOD SECURITY PROGRAMME IN THE EASTERN CAPE PROVINCE

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THIS PAPER WAS NOT AVAILABLE AT THE TIME THE PROCEEDINGS WAS PRODUCED.

Back to Table of Contents

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INVESTIGATING CHALLENGES FACING EXTENSION SERVICES AND ITS IMPACT ON COMMERCIALIZATION OF RURAL FARMERS: A CASE STUDY OF QAMATA IRRIGATION SCHEME, INTSIKA YETHU LOCAL MUNICIPALITY AT CHRIS HANI REGION, EASTERN CAPE.

Xulubana, K. L.[56]

ABSTRACT

This paper is based on secondary information received from farmers and officers through interviews. It presents the factors that impact on commercialization of rural farmers in the Eastern Cape with special focus on Qamata Irrigation Scheme at Chris Hani region. The paper also makes use of literature that deals with these factors and gives a comprehensive analysis of the role of extension services and its relevance to today's farmer and how it impacts on the development of the farmers to commercial level. According to Food and Agriculture Organization (FAO) Corporate Document Repository produced by the Economic and Social Development Department, "extension services has no definite definition" as is cited by Zwane, 2012 in the South African Journal of Agricultural Extension. Extension services is supposed to lead development of the rural people, for example, economically and this has not materialised as yet in this area for the majority of farmers. They are still dependant on government assistance in order to put food on the table. If Extension officers were better equipped and skilled, would this lead to better performing and more commercialized farmers in rural areas of Chris Hani region- Qamata Irrigation Scheme, Intsika Yethu Local Municipality, Eastern Cape?

Although a lot of research has been done on smallholder farmers in irrigation schemes, it has always been focused on how the welfare of people in have been improved due to the intervention of government programmes. Since the transformation of their lives has been minimal, as previous research has indicated, there has been a need to establish the cause of the underperformance of irrigation schemes. In this research, the data is based sample 50 farmers drawn from Qamata Irrigation Scheme was interviewed and each farmer's perspective on the state of extension services offered to them and its suitability to their needs. This research also attempted to investigate whether the farmers had any level of entrepreneurship suitable to them becoming commercialised farmers. It is also finding out whether extension officers are skilled and equipped to assist rural farmers develop themselves to become commercial; to identify and discuss the areas of concern holding extension services back and to present a different concept of extension that is more in line with today's farmers and agricultural environment.

The study findings are that extension officers are regarded as out of their depth due to offering services that are out of touch with farmers' needs. Improving these services would produce better performing and commercialized farmers in the area. The study also indicated that although farmers have a desire to become more commercialised, government of policies, land tenure, training levels in farming, farmer's motives and access to information. Extension officers felt that training in new technologies would make them more competent in their jobs as the services they offered sometimes felt outdated in today's world. The recommendation would be that the level of training offered to extension officers be improved especially on new technologies, on farm basis if possible.

1. INTRODUCTION

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What is agricultural extension? According to Food and Agriculture Organization (FAO) Corporate Document Repository produced by the Economic and Social Development Department, "extension services has no definite definition" as is cited by Zwane, 2012 in the South African Journal of Agricultural Extension. Extension can be viewed in two ways, traditionally and as a new concept.

Extension was regarded as the extending agricultural knowledge and stemmed from the results of agricultural research done and having the farmers as clients. The process that was followed is illustrated below:

RESEARCH → EXTENSION → FARMER (Terblanché, 2007)

As the years went on it became clear that a number of extension principles that underline a new extension approach needed to be developed. It was during the 2000/2001 financial year when extension officials in South Africa identified effective extension approach principles and the following were prioritized:

- Participation of farmers, researchers and extension personnel. This would include the empowerment, ownership and inclusivity of all role players. Needs based (balance between felt and unfelt needs)
- An evaluation of the progress of programs with all role taking accountability for their part
- The programs must be goal driven
- All institutions necessary for the success of extension services must be mobilized and organized
- The extension services programs must be sustainable
- The behavior change must be made the focus
- Priority approach
- There must be a coordination or linkage of all stakeholders and role players
- Technical support
- Equity (Düvel, 2002; and Department of Agriculture, 2005; Lombard, 2003 and cited by Terblanché, 2007)

For this study the author has also consulted the following publications: Agri Seta, 2010; Aliber *et al.* 2007; Anandajayasekeram *et al.* 2007; Baloyi, 2010; Bembridge, 1984; Cousins, 2012; Denison & Manona, 2007; Fanadzo, 2012; Hunter 2007; IPTRID, 2000; Kelly *et al.* 2012; Manona *et al.* 2010; Mcelwee, 2006; Obi *et al.* 2011 and Swanson, 2005.

1.1 Problem statement:

Extension officers need to be kept abreast of new technologies through, which differ from farmer to farmer and area to area. This can be achieved only by the extension officers having valid and up to date information on new technologies, its applicability and receive technical training and assistance on these new technologies.

This is the challenge currently faced by the extension services as is, as it uses the so called, "blanket approach", resulting in different farmers being offered the same services. There is also a challenge of extension officers having no voice due to policies they work under since the decision making of what happens in their areas of operation. Even when they have any ideas, they are unable to execute them due to constraints they encounter. This is what leads to farmers having low confidence in the extension services offered to them as they feel that they are a "top down approach" from extension officers. If Extension officers were better equipped and skilled, would this lead to better performing and more commercialized farmers in rural areas of Chris Hani region- Qamata Irrigation Scheme, Intsika Yethu Local Municipality, Eastern Cape?

1.2 Objectives of this study:

- To find whether extension officers are skilled and equipped to assist rural farmers develop themselves to become commercial
- To identify and discuss the areas of concern holding extension services back
- To present a different concept of extension that is more in line with today's farmers and agricultural environment

2. BACKGROUND OF THE AREA

Figure 1: Photo of the Qamata Irrigation Scheme.

Qamata Irrigation Scheme (QIS) is located in the Qamata basin. It is approximately 20km away from Cofimvaba along the road, R63, from Komani to Cofimvaba. The scheme was established in 1986 and was initially funded by the Department of Bantu Development which operated under the South African government. Establishment costs were estimated at one hundred and seventy-five million Rands, (Loxton, Venn and Associates, 1998:1). The total surface area of the scheme is about two thousand six hundred and one hectares and has an estimated one thousand nine hundred and fifty-nine hectares under irrigation, (ARDRI, 1996)

The climate varies from mild to warm and humid and the area receives an average annual rainfall of 350mm to 400mm during the summer months. The area experiences frost in winter and is dry and prone to drought. The veld generally is of the sour type and has a high invasion of thorn bush and livestock has a minimum space for grazing. This results in overgrazing, which has led to land degradation in some areas. It has exotic pine trees planted to act as windbreaks around the farm lands. It has a topography of gently undulating basin and is flanked by mountains.

The soil has a highly erodible nature and this poses a threat to the irrigated lands. Lubisi dam, which when full is capable of delivering 36 million litres of water per hour to the field lands, provides the water used for irrigation at the scheme. The area is suitable for producing lucerne, cash crops and maize. The soils have a rooting depth of not less than 0.9mm and has a potential of producing about 12 tons per hectare for maize, according to the climatic and edaphic factors
(Chitsa, 2014)

3. RESEARCH METHODOLOGY

3.1 Methods or data sources

Quantitative method study

- Qamata Irrigation Scheme farmers (number unknown) is the size of the target with a sample size of 50 farmers. Each farmer has a plot of about 1.5 hectares, on average.
- Interviews with farmers - face to face and through mass meetings will be conducted.
- Four extension officers were targeted and interviewed.
- Literature (RBS, 2008)

3.2 Rationale for the Methodology

Unstructured interviews with farmers were the easiest and time effective way to gather the information required as most of the farmers are not educated and can therefore are unable to read (RBS, 2008)

3.3 The Research Design

The study used the descriptive research design, a study designed to depict the participants in an accurate way or describing people who take part in the study. It was conducted in the form of a survey and brief interviews or discussion with individuals about the topic and is a positive research strategy (RBS, 2008)

3.4 Sampling

The target population was Qamata Irrigation Scheme farmers and a sample of fifty farmers were interviewed through a non-probability sample, meaning that the exact number of elements in the population is unknown with the result that the likelihood of selecting any one member of the population, is not known. Haphazard/convenience sampling was used and the researcher selected a sample that was convenient (RBS, 2008)

3.5 Limitations of the Study

Restriction on the population for which the results of the study can be generalized due to the small number of farmers interviewed. This was due to time constraints from the farmers and the researcher's side (RBS, 2008)

3.6 Elimination of Bias

The study was objective and the researcher listened and took into account all the interviewee's views. In total thirty-two males were interviewed and nineteen farmers were also interviewed. The interviewees were conducted with different age groups, with the age group of thirty-five to sixty interviewees most dominant (RBS, 2008)

3.7 A draft of what questions farmers and officials were asked:

Farmers

- Background information
- Farming experience
- Size of farming enterprise
- Source of Agricultural information and advice
- Frequency of interaction with extension officer
- Competency of extension officer
- Farmers perceptions on extension services offered

Extension Officers

- Background information
- Work experience and role at work

- Challenges faced in extension services
- Frequency of interaction with farmers
- Technical support

4. RESULTS AND DISCUSSION

The following figures display some of the characteristics of the respondents. They are discussed after each figure.

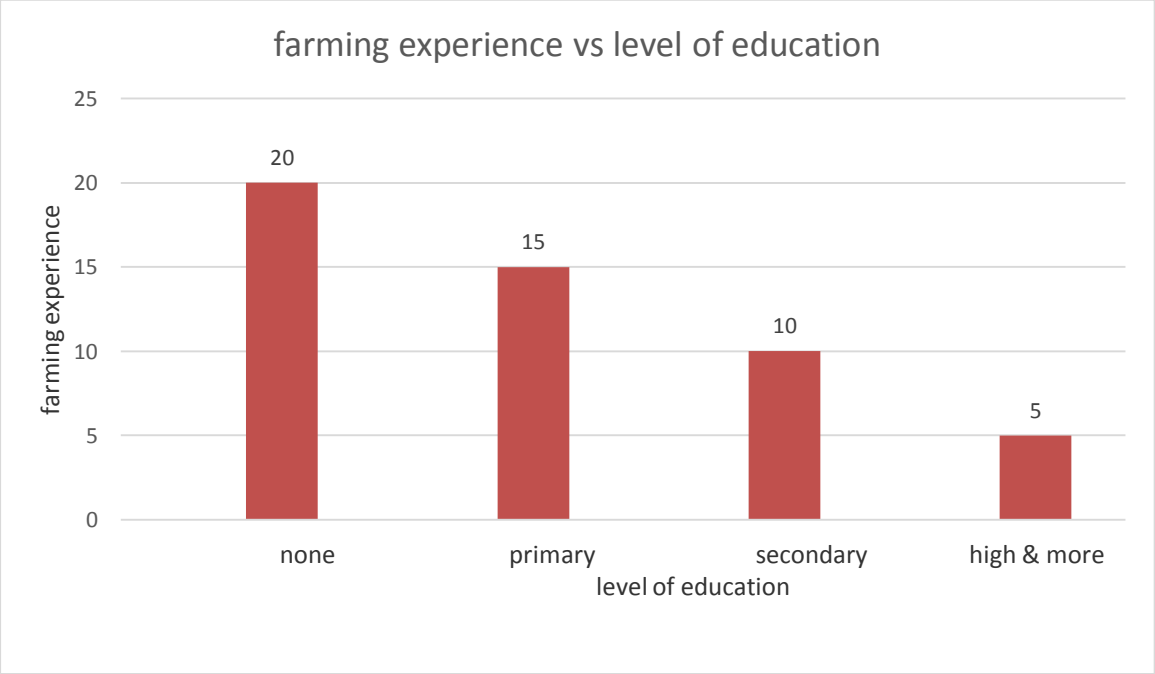

Figure 2: Farming experience vs Level of education
Survey results, 2017

The graph indicates that the higher the level of education, the lower the years of experience in farming. This results in farmers who are resistant to change as they do not understand the information and new way of extension services. These farmers grew up planting, for example, only yellow maize for themselves. They do not accept the new varieties of maize offered today.

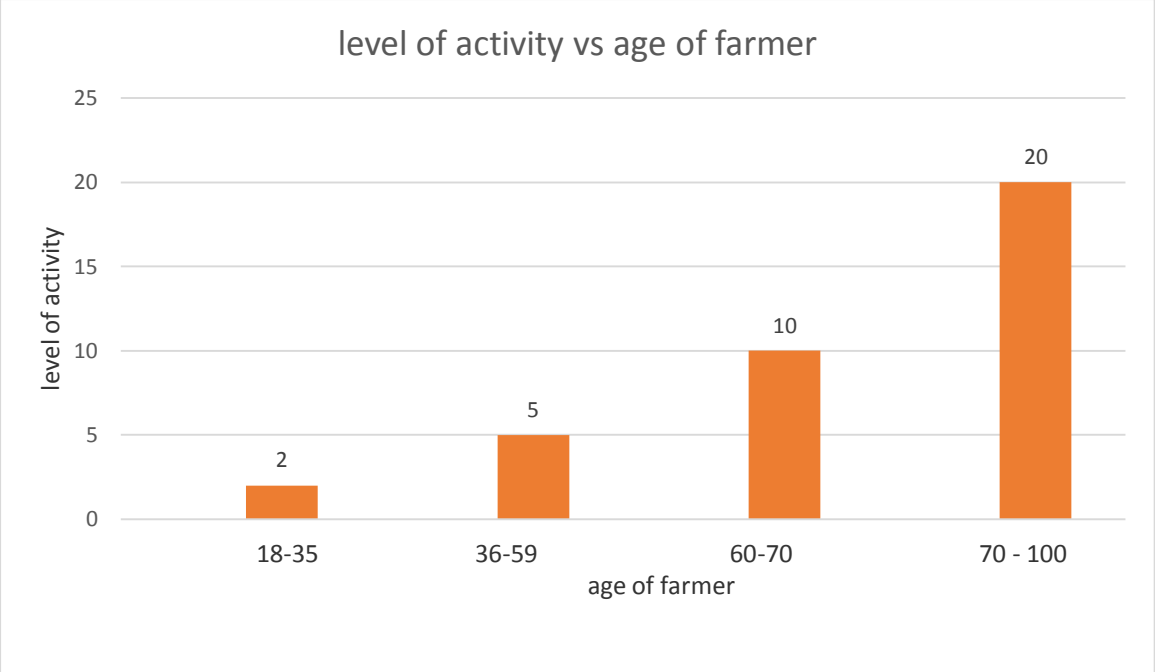

Figure 3: Level of activity vs age of farmer
Survey results, 2017

The graph indicates that the younger the farmers, the lower the level of activity in farming. Young people are not involved in farming and the older generation does not always that there are alternative ways of farming. They grew up with extension officers doing the actual farming for them while they watched and expect the same even today.

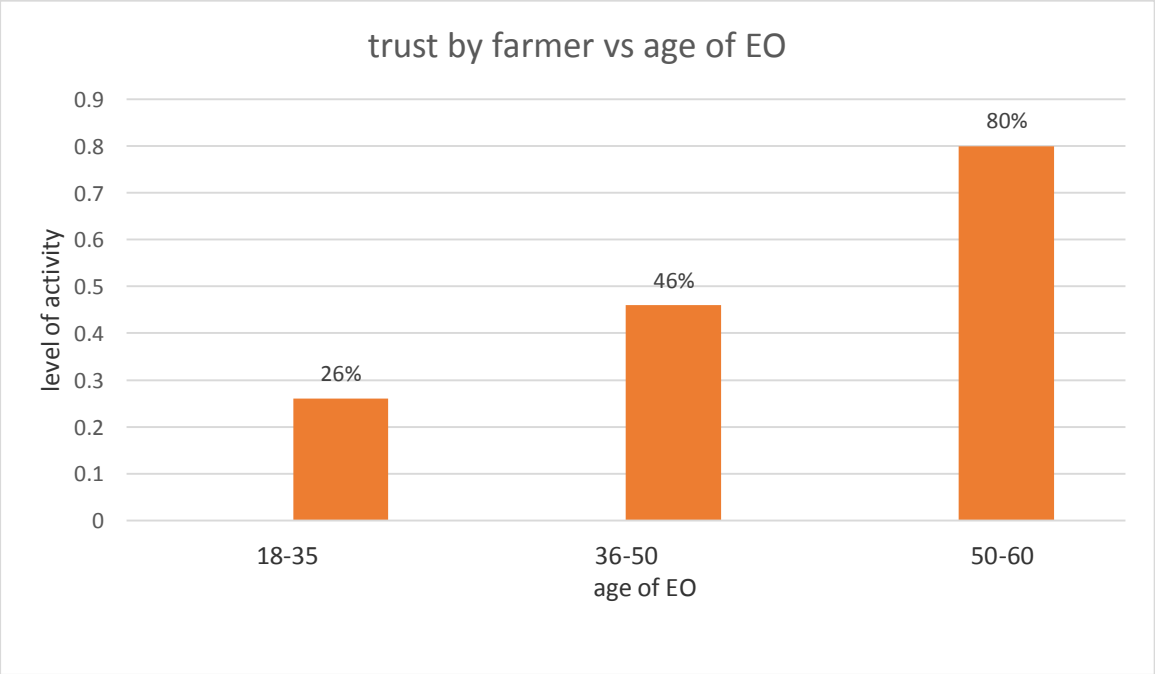

Figure 4: trust by farmer vs age of extension officer
Survey results, 2017

The younger the extension officer, the less confidence the farmers have in them.

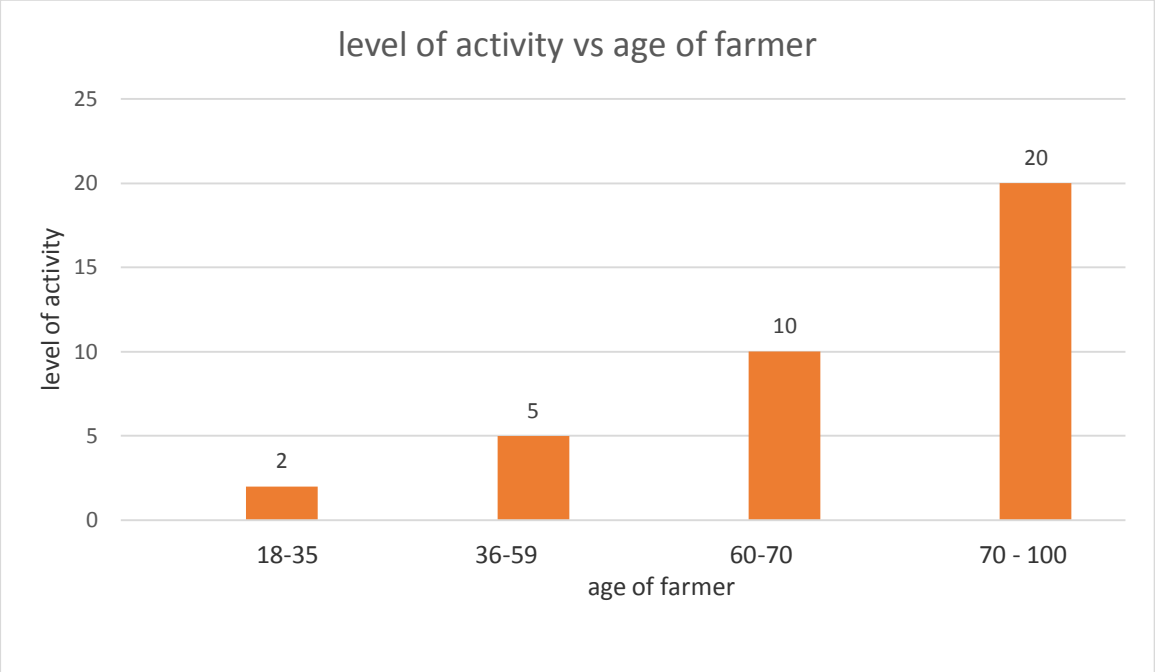

Figure 5: Level of activity vs age of farmer
Survey results, 2017

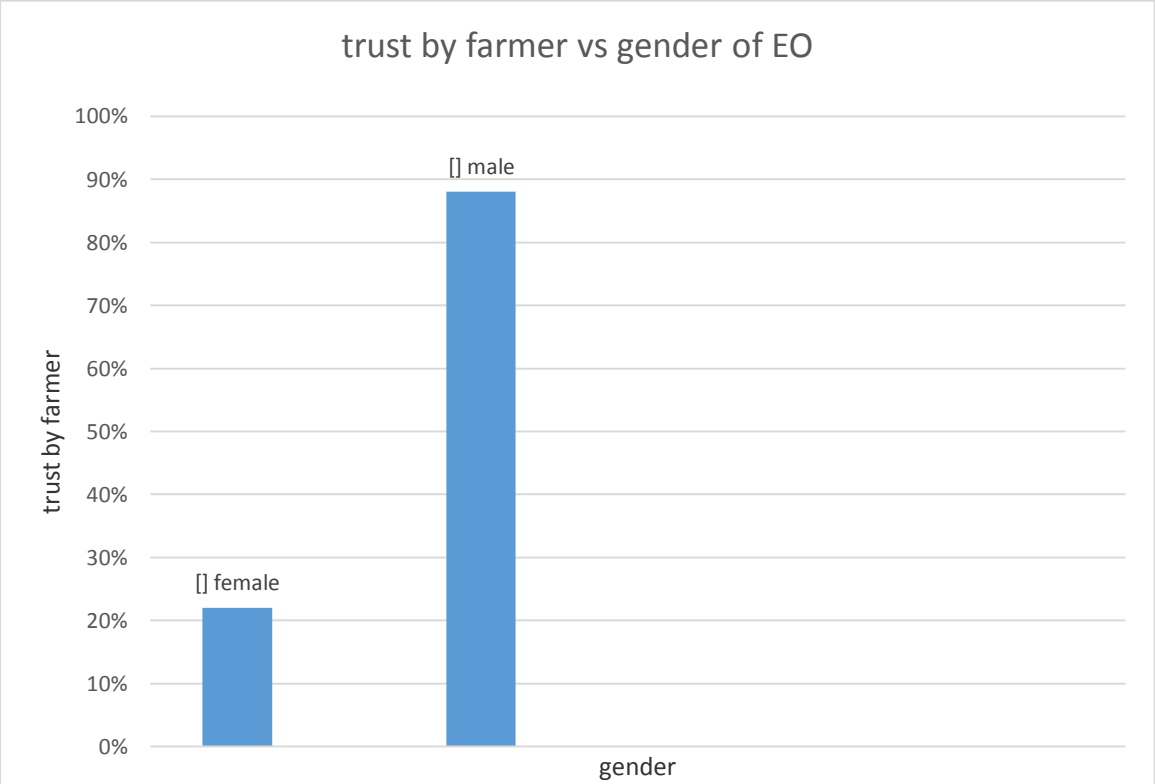

Figure 6: Trust by farmer vs gender of Extension Officer (EO)
Survey results, 2017

Farmers are more inclined to trust male extension officers in comparison to their female counterparts. This stems from the history of extension officers who were males and farmers have not accepted that females know the business of farming.

The research also revealed the that extension officers are regarded as out of their depth due to offering services that are out of touch with farmers' needs - top down approach, for example, at Qamata some farmers have long indicated that they are not happy with yellow maize and would rather produce white maize. They have also indicated that they would rather plant lucerne instead of maize. The extension officers offer them only yellow maize and this leads to frustration for everyone involved as the extension officers have no say in the programs that are offered- top down approach.

Extension training and job expectations has a discourse as college teaches that extension officers are there to lead the farmers while the job expectation is advising farmers. Lack of resources for extension officers to perform their duties, such as inadequate number of vehicles, leads to underperformance and lowered service delivery. Discrimination of extension officers by farmers due to their place of origin also presents a challenge for extension officers. Farmers prefer working with people from their local municipalities and villages and treat the officers like "aliens". Farmers were also found to have a high dependency on government support for farming activities and this led to the lack of accountability by farmers as they do not take responsibility for their farming activities. They expect the extension officers to be responsible for their activities.

Farmers felt that extension officers do not respond quickly enough to farmers, e.g. fixing of irrigation system and do not believe the officers when they inform them that their complaints have been accelerated to the relevant management. They end up going to higher offices of the department to request assistance and this reflects badly on the officers on the ground. The research also found that social issues hinder farmer productivity as the farmers spend too much time on in-fighting instead of farming activities. The land tenure system is also limiting to farmers as they are not willing to invest too much money on land that they do not own, which leads to them expecting government to do everything for them.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Extension officers are regarded as out of their depth due to offering services that are out of touch with farmers' needs. Improving these services would produce better performing and commercialized farmers in the area.

5.2 RECOMMENDATIONS

Farmers require the following from extension services:

- Develop an organizational structure of extension educational system
- Increase farmer production and improve farmers' lives
- Provide technical knowledge, management and information for farmers
- Help farmers deal with natural resource problems
- Facilitating the training process for new technologies among all farmers.

Extension officers need the following in order to improve extension services:

- Communication skills (verbal; non- verbal; written and mass communication)
- Group facilitation skills through Participatory Rural Appraisal
- Extension management
- Resources and technical competency

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Back to Table of Contents

AN IMPACT ASSESSMENT OF THE MECHANIZATION PROGRAMME IN DEVELOPING MSINGA FARMER'S TO COMMERCIAL FARMING.

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ABSTRACT

The KwaZulu Natal Department of Agriculture and Rural development (KZNDARD) developed Mechanization programme as an approach to develop farmers from subsistence to smallholder and from smallholder producer to commercial farming. The aim behind mechanization programme is to assist cooperatives to increase and sustain food production, and capacity building through skills development and by providing them with the necessary agricultural inputs and implements including tractors. The purpose of the study was to assess the impact of the mechanization programme in developing Msinga farmers to commercial farming. The study was conducted in four extension wards 4, 5 (with irrigation scheme), 17 and 18 (practice dry land cropping), Msinga is considered as poverty-stricken area. Sixty farmers were random sampled to collect data because of their participation in the programme. Results indicated that 95% of beneficiaries were indigent women farmers who their main source of income was social grant. Income of these farmers improved significantly due to their participation in the programme as there had enough to eat and sold extra produce for income generation. Ninety five percent said that the program has positive impact to the indigent households and 5% felt that the programme should not focus on co-operatives (communal estate) only, but the policy should also cater for individuals. Sixty three percent beneficiaries from the irrigation scheme wards believed that their lives have been improved as they are now able to buy inputs such as seedlings and chemicals while twenty seven percent of farmers from ward 17 and 18 revealed that their household food security level has been improved as now are able to have food on the table. Mechanization programme had positive impact and a possibility of commercializing farmers of who are planting at the irrigation scheme Msinga.

1. INTRODUCTION

"Agricultural mechanization is the application of mechanical technology and increased power to agriculture, largely as a means to enhance the productivity of human labour and often to achieve results well beyond the capacity of human labour" (FAO, 2008: 1). It is further argued that mechanization comprises usage of tractors of countless kinds as well as animal-powered and human-powered equipment and gears, and interior ignition machines, rechargeable engines, planetary controlled devices and other means of energy transformation. Moreover, irrigation systems, food dispensation and linked machineries and tools are included.

This paper was set out to assess the impact of mechanization program towards development of rural farming communities based on transforming current traditional farming to a modern

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commercial system compatible with the competition that exist within the entire agriculture sector. Critiquing of several issues as articulated in literature will be articulated in the document in order to become closer to facts concerning the program since government and other relevant stakeholders deliberated much of the hard-earned resources of the state. Those factors include contribution of agriculture to the economy of the nation, aims and sustainability of mechanization

1.1 Problem statement

South Africa is considered food secured at the national level however, the situation is different in the rural areas with insecurity a real problem. Government has advanced a number of programs towards smallholder food insecurity. The KwaZulu Natal DARD as one of its attempts to address the issue in the rural areas developed a strategic program known or adapted as mechanization programme (communal estates) to alleviate poverty and assist farmers to upgrade from smallholder to commercial farming in the Province of KwaZulu Natal. However, there are both positive and negative progresses with regards performance in the province.

1.2 Main Objective

To assess the impact of the mechanization programme in developing Msinga farmers to commercial farming.

1.3 Specific objectives were to determine:

- The impact of mechanization programme to Msinga farmers.
- The level of participation by the beneficiaries in mechanization program in Msinga.

2. LITERATURE REVIEW

2.1 Agriculture in Africa, South Africa and KwaZulu Natal

According to Moyo (2003), "agriculture is a core sector for food security, since it provides not only food to different households, raw materials, employment and foreign exchange as well as other essential resources for economic development". Devereux and Maxwell (2001) also stated that "Agriculture is the important sector that can improve household food security, it is the only source of the food, source of employment, livelihood and as one of main motors of economic activity". Machethe (2004) also said that, Agriculture contributes to poverty alleviation at rural, urban and national levels in three ways:

a) Reducing food prices,
b) Employment creation;
c) Increasing real wages; and improving farm income.

Policy makers in Africa have long recognized the importance of Agricultural sector to the continent. The reason behind was that agricultural sector in Sub-Sahara Africa wide spread perception that it was underperforming. The average growth in the 1990s was 2.1 per cent less than that achieved in the Asian regions such as pacific region where agriculture plays a comparable role (Devereux et al, 2001).

In South Africa, agriculture characterized by dual sector, a subsistence agricultural sector that is largely black farmers and on the other a commercial sector, which are largely white

farmers. According to Aliber & Hart (2009), the black farming sector in South Africa appears to contribute rather minimally to overall agricultural outputs in South Africa.

According to General Household Survey (July 2011), KwaZulu-Natal 28.7% households were involved in agriculture production and 17.6% of households in KwaZulu-Natal reported receiving significant agricultural support followed by the Eastern Cape Province (General Household Survey, July 2011). In KwaZulu-Natal 22% of households are growing fruits and vegetables, the lowest in the country 46% of households are growing grains and other food crops.

Msinga is probably the leading local municipality in small-scale commercial vegetable cultivation in KwaZulu-Natal partly because of its long-established irrigation scheme (Mkhabela, 2005). Farming contributes 18% of the income for the area. Approximately 30% of the municipal areas to the north comprise commercial farmland (Msinga IDP 2011). The local vegetable-based cropping sector is vital to the local economy, but it has faced severe problems during the last decades.

2.2 Importance of agriculture in the economy

Agricultural growth has strong and positive impact on poverty often significantly greater than that of other economic sectors (FAO, 2004:12). A study conducted in Indonesia found that agricultural growth reduced the depth of poverty by 50% in rural areas while the percentage for urban areas was 36% (FAO, 2004).

However, most African farmers are disadvantaged at every stage in the process of producing and selling crops. Approximately 80% of Africa's farms are small plots run by rural farmers and if they are equipped with knowledge of best agricultural practices and with basic inputs such as seeds; they can maximize yields of diverse crops to feed themselves, their families and their community.

2.3 Crop production

Farming remains the mainly vital way of food production for common people in the developing world, however the increase of people has enhanced strain on land as more land required for settlement (Musotsi AA, Sigot A.J & Onyango MOA: 2008). Agriculture contributes to the Gross Domestic Product (GDP); the source of foreign trade, accounting for about 40% of the continent foreign currency income; and the key generator of investments and income tax returns.

People living in rural areas have access to land but require essential skills and access to resources to farm sustainability.

Some of these problems are the limited capacity of the land for productive agricultural development due to poor soil quality, adverse climatic conditions and soil erosion resulting from overgrazing. In general, the areas under extensive farming have unpredictable and unreliable rainfall (Msinga receives an average of 600–700 mm/annum) and land degradation is very prevalent, this often fails to support rain-fed agriculture, resulting in persistent crop failures and subsequent food shortages in the area, making sustainable farming difficult. At present, 1 967 ha of land is cultivated, of which 723 ha are under irrigation and with about 6 800 ha of land having a potential for dry cropping. Numerous community garden

clubs/groups also cultivate vegetables on 89 ha of land, and these are predominantly located along available water sources (Msinga Municipality, 2011). However, the DARD in KZN with the mandate of small-scale farmers' development launched several programs to develop this sector, including subsidy schemes for fertilizer, seed, seedlings and extension services.

2.4 Sustainable mechanization

Mechanization is a crucial input for agricultural crop production and one that historically has been neglected in the context of developing countries. Factors that reduce the availability of farm power compromise the ability to cultivate sufficient land and have no long been recognized as a source of poverty, especially in Sub- Sahara Africa. Increasing the power supply to agriculture means that more tasks can be completed at the right time and greater areas can be formed to produce greater quantities of crops while conserving natural resources.

According to FAO & UNIDO (2008), "Agricultural mechanization aims at reducing human drudgery, increasing yields through better timeliness of operations because of the availability of more power, bringing more land under cultivation, providing agriculture-led industrialization and markets for rural economic growth, and ultimately improving the standard of living of farmers". The technology can be applied to aspects of agriculture such as: land preparation, weeding, harvesting, pest control, irrigation and drainage, transportation and crop processing and storage.

For mechanization management to succeed, some other inputs upon which it will strive must be available. These include good and focused political manner of governance capable of formulating and implementing policies and laws that can accelerate the process of economic growth and development. Mechanization management should address the challenges facing the future of food demand and supply (Raoult- Wack & Bricas, 2001).

Sustainable agricultural mechanization can also contribute significantly to the development of value chains and food systems as it has the potential to render postharvest, processing and marketing activities and functions more efficient, effective and environmentally friendly. Women play an important role in many farming-based communities and in some countries, up to 80 percent of the total farm labour comes from women.

2.5 Sustainable mechanization can:

- Increase land productivity by facilitating timeliness and quality cultivation
- Support opportunities that relieve the burden of labour shortage and enable households to withstand shocks better
- Decrease the environmental footprint of agriculture when combined with adequate conservation agriculture practices, and
- Reduce poverty and achieve food security while improving people's livelihoods.

To achieve sustainable mechanization levels in agricultural production and processing, Africa needs its own crop of entrepreneurs to seize the market and technical opportunities of the twenty-first century.

3. RESEARCH METHODOLOGY

This study was designed to assess the impact of mechanization programme in Msinga,

KwaZulu Natal that was initiated by KZN Government through interviews to household's family members in the area using a structured questionnaire. Msinga Local Municipality is made up of 18 wards, situated in Northern KwaZulu Natal under uMzinyathi District Municipality.

3.1 Reasons for the selection of the four wards out of eighteen Msinga wards were the following:

The researcher aimed to get more information by selecting special wards with different backgrounds. Msinga have mixed wards in terms of development and agricultural potential. Ward 18 is one of those considered as the poorest ward in Msinga, while ward 4 and 5 practicing irrigation cropping, ward 17 considered as peri urban ward. This allows the comparison and to draw up the conclusions about the impact of mechanization programme in households of Msinga

Table 1: The distribution of respondents per ward.

Study Area	Wards	Selected Community	Key Informants
Msinga Local Municipality	4	Mgolweni	15 (Participants)
	5	Mvithi	15 (Participants)
	17	Gwamanda	15 (Participants)
	18	Mthaleni	15 (participants)

4. DISCUSSION

The distribution of the characteristics of the respondents are reflected in the following figures.

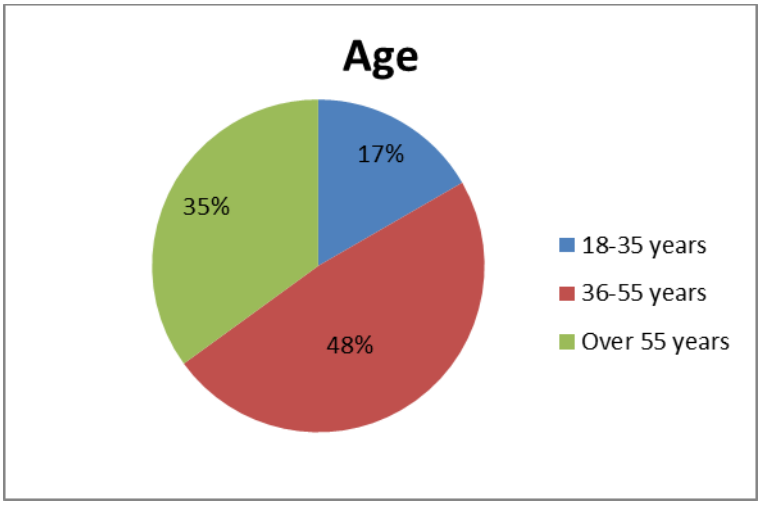

Figure 1: Age category of respondents

Majority of the respondents were those aged between 36 and 55 years making a total of 48%. Youth is less active in the mechanization programme as indicated by the above graph youth was 17% while over 55 make up 35%. Youth beneficiaries were those participating in the irrigation scheme.

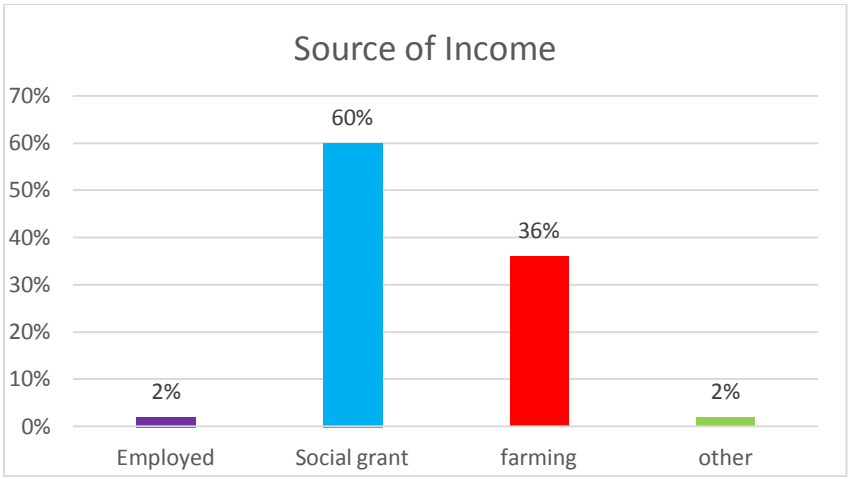

Figure 2: The respondent's source of income

The above graph implies that there is very weak income in the study area. Sixty percent of respondents their sources of income is from social grants, two percent employed, and thirty six percent rely on farming and two percent from other business.

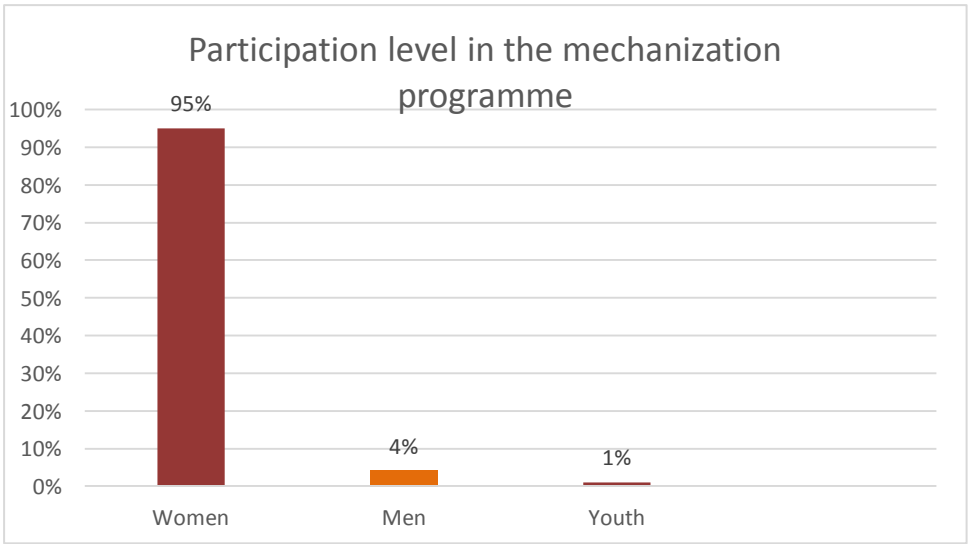

Figure 3: Participation level in the mechanization programme.

Based on the study findings in Msinga women are the one who participates most in the mechanization programme than men. The above graph shows that 95% of women are the one who do most of the activities for the project to be a success. Men participation is 4% and Youth 1%

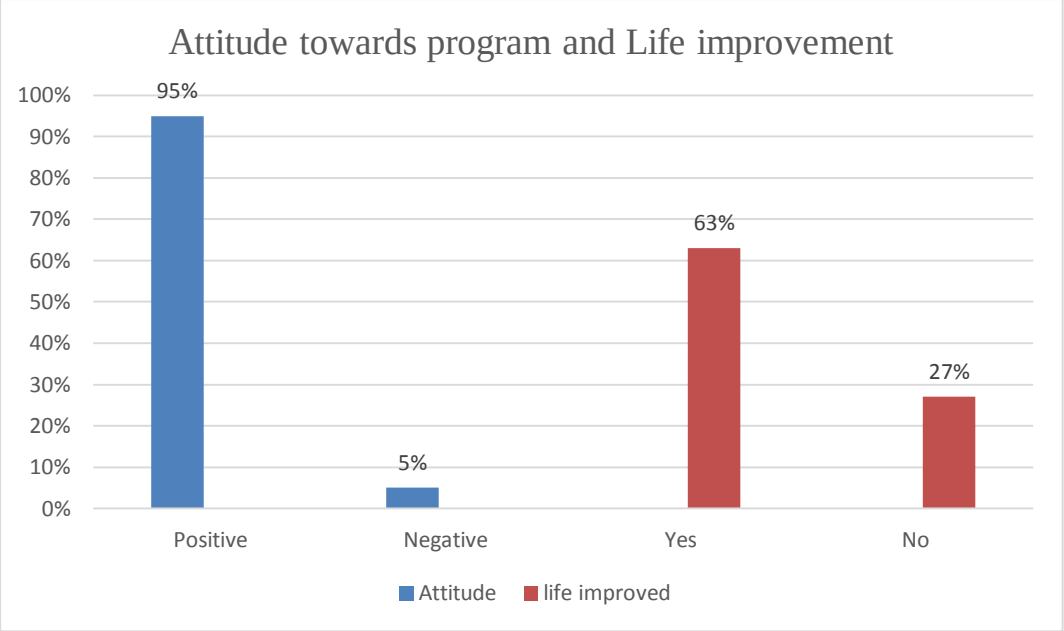

Figure 4: Attitude towards mechanization programme and Life improvement in Msinga

From 60 beneficiaries interviewed 95% said the program has positive impact to the indigent households and 5% felt that the programme should not focus on co-operatives (communal estate) only, individual should also be assisted. Sixty three percent beneficiaries from the irrigation scheme wards said that their lives has been improved as they are now able to buy inputs such as seedlings and chemicals while twenty seven percent of farmers from ward 17 and 18 revealed that their household food security level has been improved as now are able to have food on the table however they felt that government should continue to assist them.

Table 2: Challenges of the Mechanization Programme

Irrigation Scheme (ward 4 &5)	Dry Land (ward 17& 18)
Long waiting list to get assistance due to shortage of tractors	Long list to get assistance because services are free
Market demand and farmers prefer cash on hand	Climate variations
Input suppliers are too far and the nearby suppliers are too expensive	Transport cost are too high to deliver produce to the market
Limited area for production	Tractor breakages that hinder activities

Table 3: Possible Solutions

Irrigation Scheme (ward 4 &5)	Dry Land (ward 17& 18)
Additional tractor fleet and tractor	Tractor activities should be paid for to eliminate delays on minor repairs
Change farmers mind set	Practice environmentally safe activities
Buy in bulk to reduce transport costs	To have pack house around Pomeroy town
Those who are not using their land, must lend those who wish to use it effectively	Need mechanics around Msinga

4.1 Findings discussion of the study

This study intended to assess the impact of the "Mechanization Program" on food security in Msinga KwaZulu Natal. The findings from the study indicate that the mechanization program in Msinga had a positive effect in household food security as 95% of respondents said that mechanization programme has positive impact in their lives. The findings discovered that 95% women are the one who participates in the mechanization programme. Sixty three percent of beneficiaries said that their lives has been improved while 27% said that the programme is helpful to them, but they need more assistance from the department.

The study also reveals that most beneficiaries of the mechanization programme rely on government to provide production inputs (seeds, fertilizers, chemicals) since Msinga is dominated by indigent, vulnerable households.

5. CONCLUSION

The study was based on Msinga mechanization programme situated under uMzinyathi District Municipality. The main aim of the program was to ensure that households are self-sufficient in food production. The Mechanization Program in Msinga has helped to improve the food security status for the households. The quantity of food as food produced by households leads to members of the same household having access to food. The mechanization programme in Msinga are a good example of how one can combine the natural, social, physical and human capital to produce enough food for the households in a sustainable way. Through mechanization, the problem of food insecurity can be addressed since households can participate in mechanization programme in order to supplement their household's food basket. There are benefits that are attained from engaging in this activity such as reduction of household expenditure on food, and income generation exercise.

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Back to Table of Contents

ENHANCING FARMERS' AGRICULTURAL EXTENSION OUTREACH IN UNIVERSITY MODEL VILLAGES THROUGH PARTNERSHIP.

Oloruntoba, A.[58]

ABSTRACT

Nowadays, universities have embarked on expanding access to agricultural advisory service to communities through extension outreach strategy. The paper presents how a university-based extension could facilitate rapid technological change at the farm level and bridge the agricultural information gap for sustainable food security and improved livelihoods through partnership. The study was based on a cross-sectional survey conducted on 357 household heads purposively selected to represent different farm families and socio-economic categories. Findings show that the major survival factor for partnership with the university is the need for food. The study provides lessons on how partnership and collaboration could greatly alleviate the socio-economic challenges of small farmers in a sudano/sahelian-savannah ecosystem.

Keywords: Partnership, extension outreach, household, model villages, socio-economic, livelihoods

1. INTRODUCTION

In many developing countries, agricultural extension services as an institutional support has been and still remains largely public sector-driven which has not achieved much because they are owned by government which has failed in its responsibility to provide necessary extension services, infrastructure, market access, and safety nets. In Nigeria, public investment in the State-wide Agricultural Development Programmes (ADPs) in the mid-1970's to late 1990's has been reduced to zero allocation due to seizure of The World Bank loan used in financing it. Following the near-collapse of the ADP supply-driven public agricultural extension system at different periods from 1990's up to now, the University Extension initiative appears to be the panacea in 'helping the farmers to help themselves.'

Recently, some universities embark on extending access to agricultural extension services to rural folks through collaboration with farmers to bring about the expected successes and provide opportunities and encouraged partnership with other stakeholders in the delivery of extension to farming communities. Oloruntoba & Adegbite (2006) posited that the provision of extension by the university coupled with other factors have had significant positive influence on decision to adopt introduced cultural practices with attendant improvement on the well-being of participating farmers. Davis (2009) reported that agricultural extension, or agricultural advisory services, comprises the entire set of organisations that support people engaged in agricultural production and facilitate their efforts to solve problems; link to markets and other players in the agricultural value chain; and obtain information, skills, and technologies to improve their livelihoods. Swanson (2008) also reported that transfer of technology still has relevance since agricultural extension is now seen as playing a wider role by developing human and social capital, enhancing skills and knowledge for production and

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processing, facilitating access to markets and trade, organising farmers and producer groups, and working with farmers toward sustainable natural resource management practices.

1.1. The university outreach extension

Basically, Universities were established to provide leadership, advance learning through teaching and research but, could also serve as beacon to the society in terms of outreach. For instance, some attempts have been made with success through partnership with rural communities. The Isoya Rural Development Project of the Obafemi Awolowo University Ile-Ife, Badeku Extension Village Project by the University of Ibadan, Extension Model Village of AMREC at the Federal University of Agriculture, Abeokuta, The Maigana Outreach Village Project of the Ahmadu Bello University Zaria and lately the Federal University Dutse Centre for Agricultural Research and Extension Services [FUD-CARES] established as an institutional support services operating in the sudano/sahelian-savannah ,North Western State of Jigawa, Nigeria.

The University Extension Outreach is an effort to bring agricultural extension services to the farmers in their homes or farms. CARES use outreach to achieve its flagship mandate which could be view from two perspectives: From the first part, outreach means, to reach out and bring in groups and individuals to be part of the CARES, which is *engagement*. The second part is sharing what we learn with Extension / Research Fellows, farmers and other partners, which is *dissemination*. Hence, effective *engagement* requires that all parties including CARES, partners and farmers should be satisfied with the extension delivery. According to Seger (2016a) definition of *engagement*, it is a meaningful conversation, interaction between people, and active listening. Several authors (King & Boehlje, 2013; LaBelle et al, 2011; Smith, 2004) noted *engagement* has been critically important to Land Grant university system in USA and that attracting non-traditional extension audiences is key to a successful extension future. Successful *engagement* can then lead to social and economic change; extension can and should be a major player in these efforts (Reed, et al, 2015).

Again, Seger (2016b) posited that *engagement* is a form of leadership where initiation and cultivation of interaction develops new opportunities for extension. Rosenblatt (2010) describes *engagement* as a pyramid involving six layers: observing, following, endorsing, contributing, owing, and leading. According to Oloruntoba & Adegbite (op cit), outreach is an educational and action-research-based information source enabling farmer to make decisions that improves quality of lives. It is therefore the art and science of understanding and responding to the needs and wants of groups of people. Lubell et al. (2013) noted that outreach programmes could enhance adaptive capacity when they capitalise on the structure of knowledge systems in ways that help farmers react to the changes in economic, social, and environmental processes

The situation analysis of the rural communities around the university depicted that of peasantry with very low annual income, large household size, small fragmented lands, low education and very weak agricultural extension linkage (Oloruntoba et al, 2015). CARES mission is to uplift the livelihoods and guarantee food security of rural farmers by strengthen the structural base in the provision of action-research and extension services. Apantaku et al, (2003) examined smallholder farmers' involvement in agricultural technology generation and utilisation and reported that the level of farmer's involvement in the agricultural problem identification and prioritisation was low because majority of the technologies were not based on farmers identified problems and felt-needs. To achieve the desired results, the Centre has a

central role to play through outreach and active involvement of multi-stakeholders including policymakers, NGOs, Research Institutes, agro-input-supply agencies and beneficiaries. According to Leuci (2012) such outreach extension service is a blend of approaches and processes which boost the skill development and information access. Therefore, the establishment of CARES by the university has become a social responsibility to build relationship with inhabitants through robust *engagement* to promote 'town and gown' and *dissemination* of improved agro-technologies refer to as improved planting materials, breeds, agronomic packages and practices, production processes, methods and techniques (ARCN,2009).

It is against this background that the paper analyses partners' engagement in enhancing research and dissemination of agro-technologies under CARES as follows:

- identify socio-economic condition of farmers in extension outreach villages
- identify potential partners which have similar vision of developing communities and farm families;
- identify and choose relevant partners for CARES.

2. MATERIALS AND METHOD

2.1 Study area

The six outreach communities under CARES bordering the University are Maja, Bulori, Gurungu, Hausawa, Kargo and Kawayi. The contiguous villages are located on 2811 hectares of land in Dutse Local Government Area, Jigawa State, Northwestern Nigeria constitute the study area (Fig. 1). Dutse is generally described as sahelian; with annual rainfall of 300 to 400 mm per annum and average annual temperature of 21.2^{o}C in January to 30.9^{o}C in June. The rainfall curve is mono-modal in nature with onset in May, cessation in September and the peak period in the August of each year. The rainfall regime is therefore very short (within 4 to 5 months) leaving most of the year with dry spell. The area therefore has attendant environmental challenges such as drought and desertification.

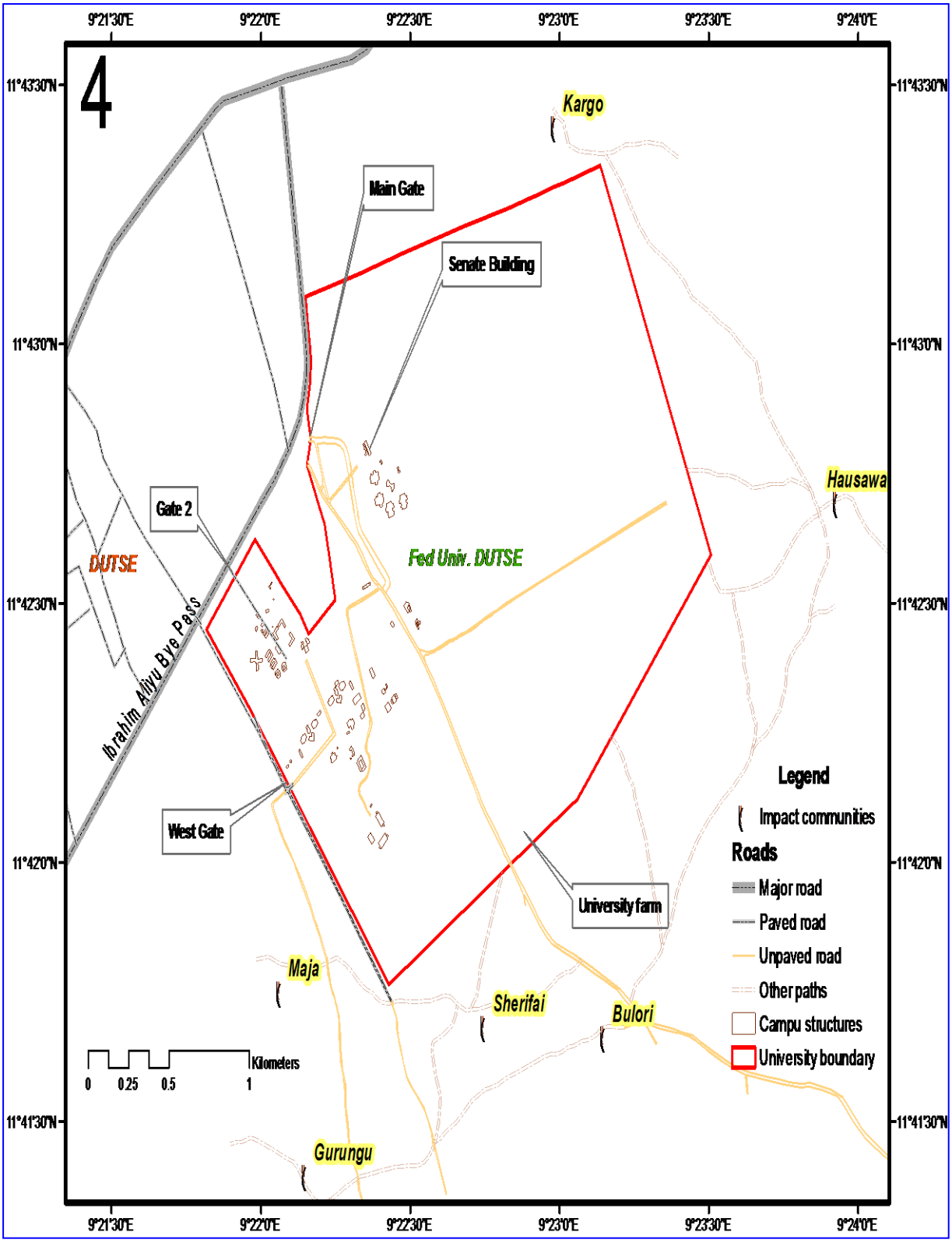

Figure. 1: Spatial Map of Federal University Dutse CARES Outreach Communities (**Source:** Field Survey Oloruntoba *et al*., (2015)

Typically, in this part of the country, a village is a common type of settlement which consists of many farmers' dwellings either with their farms or some distances away from the village. Hence, these rural village communities are mainly of nucleated with few dispersed settlement patterns, homesteads, barns, schools and mosques frequently visited by the inhabitants. Local

mini-markets are usually found at the village square with main markets located in near-by major towns; the boundary of the community though might not be very distinct from another has been spatially mapped. The inhabitants are mainly Hausas with few Fulanis and other ethno-linguistic groupings. The primary occupation is mainly subsistence farming with little or no access to agricultural extension. The predominant cropping system is intensive cultivation of rain-fed mixed cropping. Arable crops commonly

2.2 Data collection and sample size

A cross-sectional survey was conducted on 357 household heads purposively selected to represent different farm families and socio-economic categories in the six CARES outreach extension villages of Bulori, Gurungu, Hausawa, Kargo, Maja and Sharifai bordering the Federal University Dutse, Jigawa State (Table 1). The primary data were collected using a household questionnaire which was subjected to both face and content validity by various experts and stakeholders before being accepted for administration on respondents. Secondary information on potential partners and other data pertinent to the study area were also collected from the Dutse Emirate Council, Dutse Local Government and Ward Heads. Quantitative data were analysed using SPSS version 18.0 to generate descriptive statistics. Data coordinates collected using Garmin Hand-held GPS were entered into ArcView GIS version 10.1 software to generate spatial maps

Table 1: Population, Household and average household size

Community	Estimated Population	Estimated HH	HH Sample size	Av. HH size	Overall HH Size
Bulori	2300	163	68	8.0	**7.6**
Gurungu	1400	530	53	2.6	
Hausawa	3500	635	54	5.5	
Kargo	3500	317	120	11.0	
Maja	1000	117	29	8.5	
Sharifai	1500	154	33	9.7	
Total	**12, 200**	**1,916**	**357**	-	

Source: Field Survey, 2015

3. RESULTS

3.1 Socio-economic condition

The study showed the state of peasantry and poverty in terms of low-income level distribution, high family size, low level of education, low farm/herd size, lack of infrastructural facilities, weak to very low extension services and negligence by government.
The households in communities are male-headed, have depressed yields and incomes due to lack of improved techniques, diversification and access to input, markets and infrastructural facilities. Male Household heads were dominant within the age bracket of 31-50 years with low average years of schooling as majority could not complete primary school. Half of the household heads attended Koranic schools with Maja standing out with the highest level of education and depended more on farming as main occupation. Households were mainly monogamous except Gurungu. The mean household size across the communities was 8 persons with Kargo having the highest of 11 persons per household. The household size tends to be aligned with the rural areas characterized by pronatalism and extended family relations.

Dependency Ratio across the communities was 1.4 indicating that 4 persons were dependent on each economically active person. Hausawa and Gurungu has the highest dependency ratio of 1.5. Most of the households (67.10%) were engaged in arable and livestock farming, the rest were into non-farm occupation such as petty trading. The total income received by all the members of household either in cash from farming of arable and livestock or other secondary sources show that the mean annual and median income for majority across the six communities was N1, 113,199.9 and N804, 500 (USD 1=NGN306 @ 04/04/2018)). The median value shows that half of the household received more than N804, 500 in the year and the other half got less than that during the same period in all communities. Household income per capital also varied across the six communities and corresponded with about N118.1 per day for Gurungu and N91.7 per day for Sharifai far from the recalibrated international poverty line of N246.25 ($1.25 per day).

Women who are important segment of the population were excluded from participating actively in productive resources unlike their male counterparts which no doubt had negative effect on household income. Findings also revealed that there were three public primary schools in the communities located at Hauwawa and Kargo with 6 classrooms block each and had 338 and 450 pupils while Maja with 528 pupils had 3 classrooms block. There were few teachers in quality and quantity; the schools lack toilet facilities, staffroom, drinking water and school feeding programme. Bulori, Gurungu and Sharifai communities have no primary schools. In terms of essential facilities like playground for the pupils, they lack completely other essentials like staffrooms, with an exception to Hausawa. The schools have limited access to sources of water; especially in Hausawa here there was no single water source. Most of the respondents (93.3% and 76%) in Kargo and Maja communities affirmed the presence of hand pumps and deep wells respectively.

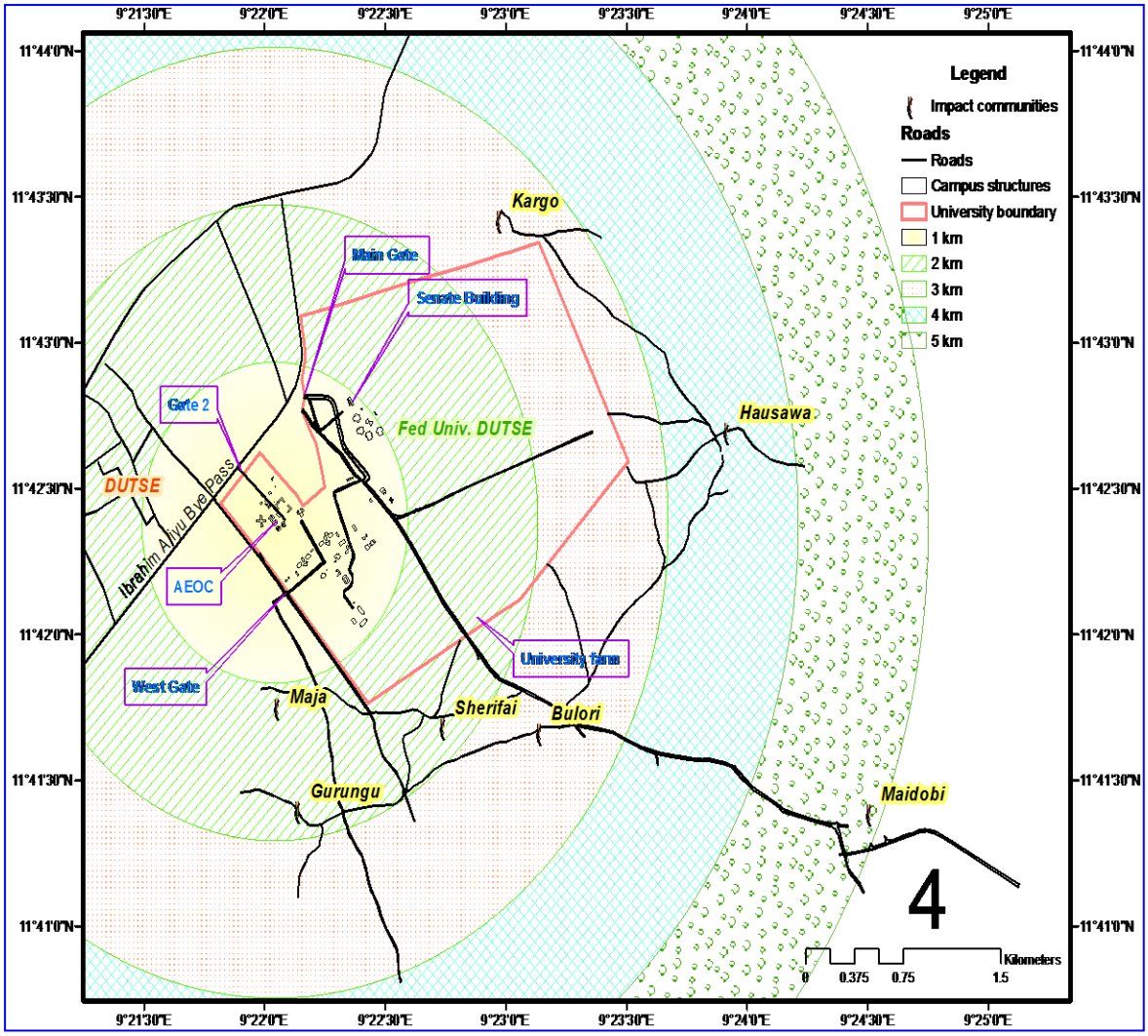

Figure 2: Map showing 5-Ring Buffers at 1 km interval around the CARES Complex
Source: Field Survey, 2015

All communities located in the immediate surroundings of the University were also tested for proximity to FUD-CARES. The closest village is Maja village which is about 1.28 km away and the farthest is still Hausawa which is 3.51 kilometers away from the CARES Office in direct (Euclidean) distance calculation. This is further depicted by the buffer map in Fig.2

3.2 Potential partners similar vision with cares

Agricultural research and extension services consist of potential partners and collaborators that influence engagement in technology generation and dissemination. Greater emphasis is now being placed on active involvement of multi-stakeholders in generation of relevant agro-technologies for dissemination on various segments of food chain. In the core mandate area of CARES in sudanol/sahelian-savannah ecosystem of Northwestern Nigeria the multi-stakeholder partnership and collaborations strategy will enable the Centre to achieve one of its flagship mandates of promoting relationship, contributing to the development of skills and knowledge of farmers to adopt new and improved agro-technologies.

Table 2 presents the list of 30 identified potential partners with vision of impacting positively in FUD-CARES catchment area. The potential partners are made up of international /

national research institutes (CGIAR), agricultural finance, government / non-governmental organisations, bilateral agencies, policymakers /local administrators, famers--based organisations, universities, government, research/ extension fellows and beneficiaries.

Table 2: POTENTIAL PARTNERS WITH SIMILAR MISSION WITH CARES

S/N	POTENTIAL PARTNERS	TYPE OF ORGANISATION
1.	International Crops Research Institute [ICRISAT]	CGIAR
2.	AfricaRice Center	CGIAR
3.	International Institute for Tropical Agriculture [IITA]	CGIAR
4.	Agricultural Research Council of Nigeria [ARCN]	NARI
5.	Sasakawa Africa Fund for Extension [SAFE]	NGO
6.	Sasakawa Global 2000 [SG-2000]	NGO
7.	Central Bank of Nigeria [CBN]	Agric Finance
8.	Federal Ministry of Agriculture and Rural Development	Government
9.	Agricultural Transformation Agenda Support Programme [ATASP-1]	Government
10.	Leventis Foundation Nigeria Limited	NGO
11.	Japan International Cooperation Agency [JICA]	Bilateral Agency
12.	University of Greenwich , Natural Resources Institute	University
13.	Dutse Emirate Council, Jigawa State, Nigeria	Local Authority
14.	National Agricultural Extension Liaison Services [NAERLS]	NARI
15.	International Fund for Agricultural Development [IFAD] CASP	Bilateral Agency
16.	Green Sahel	NGO
17.	DFID PERL Programme	Bilateral Agency
18.	International Council for Red cross [ICRS]	International NGO
19.	Save the Children	NGO
20.	Palladium	NGO
21.	Action Against Hunger	NGO
22.	Lift Above Poverty Oganisation [LAPO]	MICROCREDIT
23.	All Farmers Association of Nigeria [AFAN]	FBO
24.	Rice Farmers Association of Nigeria [RIFAN]	FBO
25.	Norwegian Refugee Council [NRC]	NGO
26.	Mercy Corps [MC]	NGO
27.	Catholic Relief Agency [CRA]	NGO
28.	United Nation Development Programme [UNDP-Rural Finance]	Bilateral Agency
29.	Research and Extension Fellows	University
30.	Beneficiaries	Outreach Villages

3.3 Identified partners for cares

Table 3 presents the list of 17 identified partners FUD-CARES could work with immediately or in the very near future in outreach villages.

Table 3: Identified partners that could work closely with farmers in outreach.

S/N	POTENTIAL PARTNERS	AREA OF PARTNERSHIP
1.	International Crops Research Institute [ICRISAT]	Human development, project development and implementation, research implementation, training of extension workers in Sorghum crop
2.	International Institute for Tropical Agriculture [IITA]	Human development, project development and implementation, research implementation, training of extension workers in Cassava crop
3.	Agricultural Research Council of Nigeria [ARCN]	Human development, project development and implementation, research generation, on-farm research, training of extension workers
4.	Sasakawa Africa Fund for Extension [SAFE]	Capacity building for SAFE top-up Agricultural Extension Programme
5.	Sasakawa Global 2000 [SG-2000]	Promote knowledge transfer and capacity building
6.	Central Bank of Nigeria [CBN]	Support agricultural credit, action-research and outreach activities
7.	Federal Ministry of Agriculture and Rural Development	Policy and Advocacy, fundraising
9.	Japan International Cooperation Agency [JICA]	Support action-research and outreach activities in mandate area
10.	University of Greenwich, Natural Resources Institute	Capacity strengthening to support research, supports the creation of knowledge networks to strengthen science, technology and innovation
11.	Dutse Emirate Council, Jigawa State, Nigeria	Leadership, advocacy and sensitisation of outreach communities
12.	National Agricultural Extension Liaison Services [NAERLS]	supports the creation of knowledge networks to strengthen extension, technology and innovation
13.	Agricultural Transformation Agenda Support Programme-[ATASP-1]	Support action-research, profiling of households, agri-business management and extension activities on mandate crops
14.	AFRICARICE Center	Promote knowledge transfer and capacity building for extension and rice farmers
15.	Beneficiaries	Demonstration plots, Field days, varietal trials on the field
16.	Research and Extension Fellows	Step-down training to farmers, On-Farm Adaptive Trials, agri-business and proposal development
17.	Agricultural Research Council of Nigeria [ARCN]	Research generation, trials and adaptation

The identified partners are summarised as follows:

IFAD

IFAD-International Fund for Agricultural Development has been Nigeria trusted partner for reducing poverty since 1985. The IFAD loans help improve outreach and its impact. IFAD

strengthen farmers' organisations, supports empowerment of rural poor people; especially women and youth. CARES will key in to IFAD's current strategy in agreement with the Federal Government of Nigeria which covers 2016-2021. IFAD continue to partner in building rural institutions, establishing community-driven development initiatives, developing profitable smallholder agri-businesses and pursuing financial inclusion for rural poor households. The Value Chain Development Programme cost US$104.7. IFAD has an office in Jigawa State. Nigeria.

AFRICARICE CENTRE

AfricaRice is a member of CGIAR part of Global research partnership for food secure future headquartered in Cote'Ivoire with a Country Station in Kano, North Western Nigeria. Of the 16 Rice varieties introduced to farmers in Kano/ Jigawa zone ATASP-1, FARO 44 -Early maturing with 90-110 days, FARO 52 with 130 days and FARO 61 with100-110 days preferred.

IITA

IITA-International Institute for Tropical Agriculture is a reputable international research centre and a member of CGIAR with headquarters in Ibadan, with Field Station in Kano,
The goal is to empower the youth in Nigeria through the full realization of the potential of cassava, rice and other mandate crops in North Western Nigeria. The institute has played strategic role in African agriculture in the last 50 years. The importance of partnership to research and development by CARES will alleviate the problem of food and nutrition security in the Outreach villages. The mandate crops which have become central to the food security of over 600 million people are cassava, maize, rice and tropical legumes such as cowpea and soybean.

ICRISAT

ICRISAT-the International Crops Research Institute for the Semi-Arid Tropics is an international NGO organisation that conducts research for rural development on highly nutritious drought-tolerant crops such as sorghum, pearl millet and groundnut. ICRISAT is headquartered in India with a Country office / Research Station in Kano, North Western Nigeria. ICRISAT and its partners help empower poor people to overcome poverty, hunger and a degraded environment through better agriculture. ICRISAT has approved partnership with CARES in the area of human development, project development and implementation,
research implementation, training of extension workers and in any other area of institutional strengthening.

FMARD / ATASP-1 /AfDB

ATASP-Agricultural Transformation Agenda Support Programme Phase One (ATASP-1) is a collaboration between the African Development Bank (AfDB) and the Federal Ministry of Agriculture & Rural Development, which is being funded by the AfDB as its contribution to agricultural development in Nigeria. The ATASP-1 is being implemented in five years (2015-2019).

The objective of ATASP-1 is to ensure attainment of food and nutrition security, contribute to employment generation and wealth creation. The Federal Government, in partnership with AfDB launched the ATASP-1 with commodity value chain development alongside infrastructure development as some of its key components in four Staple Crop Processing Zones. The four Staple Crop Processing Zones where the project is being implemented are Adani-Omor (in Enugu and Anambra States), Bida-Badeggi in Niger State, Kano-Jigawa and Sokoto-Kebbi covering a total of 28 Local Government Areas. The specific objective of the project is to identify and promote science-based solutions for rice, sorghum and cassava value chains through technology production and distribution of quality seeds and planting materials strengthened by well-built seed systems. Target groups are smallholder farmers mainly youths and women trained by IITA, AfricaRice and ICRISAT along the value chains and assisted with improved technology to record good yield in their farms and product development skills. Accessed April 2, 2018 http://www.dailytrust,com,ng/low-atasp-1-builds-capacity. CARES partners with ICRISAT and ATASP-1 Project in two villages at Miga Local Government Area, Jigawa State, Nigeria.

Sasakawa Global 2000 Nigeria

The Sasakawa Global 2000 (SG2000) is a partnership of two NGOs: Sasakawa Africa Association (SAA) and Global 2000 established in 1992 with office in Kano, Nigeria. The programme works mainly with and through the ministries of Agriculture, primarily extension services, but also with NARI's and IARC's. Support for field demonstration/ testing programmes of improved food crop technology with small scale farmers is the core activity, although over time other activities such as water harvesting, conservation tillage was added. SG2000 operates mainly in northern states of Kano, Jigawa, Katsina, Sokoto, Kebbi and Zamfara in North Western and Bauchi, Gombe in North Eastern Nigeria. SG2000 runs in close collaboration with the State ADPs. CARES has sought for partnership withSG2000 and the Memorandum of Understanding will soon be sealed.

CBN

CBN-Central Bank of Nigeria as part of its focus on taking business-driven agriculture to the grassroots launched the Nigeria Incentive-based Risk Sharing System for Agriculture [NIRSAL] and appointed an implementation partner in Anchor Borrowers Programme. This is an innovative nation-wide field structure to support 225,000 farmers under the CBN Anchor Borrowers Scheme. The structure known as the Project Monitoring Reporting and Remediation Office (PMRO), has units located in each state and the Federal Capital, Abuja. The PMDOs are designed to support NIRSAL's core mandate of making agriculture more attractive for private sector investment by de-risking the agricultural value chain. The PMDOs will also provide rigorous monitoring and supervision of NIRSAL facilitated agriculture projects to improve successful outcomes. Accessed April 2, 2018 https://www.vanguardngr.com/2018/01/cbn

FMARD -LIFE

FMARD-Federal Ministry of Agriculture initiated the Livelihood Improvement Family Enterprises [LIFE] to promote community-based activities for job and wealth creation targeted at rural farmers. The goal of the programme was to contribute to the attainment of food security and economic growth of Nigeria through job creation, value addition, and business enterprises in agriculture, rural income generation and improved livelihoods for youth and women. Part of the condition to benefit from the programme is that the farmers must belong to cooperative societies. All the beneficiaries of the LIFE programme shall be organised into cluster groups comprising youth and women cooperatives having a leadership platform from the community to the national apex.

https://www.vanguardngr.com/2018/01/jubilation-rural-farmers-get-life-line-fg/
accessed April 2, 2018

ARCN

ARCN-Agricultural Research Council of Nigeria is the central coordinating body for the 18 National Agricultural Research Institutes located in all agro-ecological zones of Nigeria. The Council is responsible for generating, adapting and transferring technologies that farmers' need to ensure food security and sustainable development. CARES have submitted partnership proposal.

RESEARCH AND EXTENSION FELLOWS

The strong relationship between teaching and learning will enhance agricultural extension and research in the university in particular and the outreach communities in general. Consequent upon this, 18 academic and professional staff of the university partner as Extension and Research Fellows under five sub-programmes of the core mandates of CARES. Fellows will endeavour to convert research findings into improving the livelihood of farm families and rural inhabitants in outreach villages. Fellows will benefit from capacity training from other CARES partners and in turn step-down training to beneficiaries and farmers in outreach villages. Fellows will also undertake to prepare research proposals or assist farmers in preparing simple Business Plans that will be submitted to donors and investors who are ready to provide essential assistance for research, training and capacity building.

BENEFICIARIES

The resource poor farmers in CARES outreach villages are the direct beneficiaries of agricultural extension services. The farmers have the potential to play an important role in providing social capital and are the real beneficiaries of the mandates. Centre will also support the instructional and research roles of the university by providing staff and students with the opportunities for further professional growth through participation in the CARES outreach initiatives.

4. DISCUSSIONS

The socio-economic results have provided information for discussion. The finding that male households' heads were dominant implies that social norms in the communities recognise men as being in control of productive resources. According to Tukson & Naadam (2006), the large proportion of male farmers as household head is very crucial for transferring and adoptions of technology since men are mostly the decision-makers in most societies. Similar results have been reported across sub- Saharan African societies (Ayalew et al. 2013; Baah et al., 2012). In contrast, Fakoya & Oloruntoba (2009) reported a high female participation of small ruminant farmers in Osun and Oyo States South Western, Nigeria.

Access to extension services and agro-information: identified as key to farm productivity in a series of studies. For instance, Obwona (2000), using the translog production function, demonstrated that access to extension services by tobacco farmers improved their productivity in Uganda. In contrast, Bravo-Ureta & Rieger (1991) using the stochastic efficiency decomposition model based on Kopp and Diewert's Deterministic method, concluded that extension services did not markedly affect productivity of farmers in New England. However, the studies by Adewuyi (2002), Ajani (2000), Amaza (2000) and Awotide (2004) reported that extension services enhanced farmers' productivity in the humid forest and dry savannah agro-ecological zones of Nigeria.

In the face of dwindling socio-economic conditions, substantial proportion of family incomes goes on food while households tend to use different coping strategies as safety nets that forced families to change their food habits. The strategies employed by households in coping with severe food shortages especially among those with no visible or low income when drought, pests and diseases such as *Striga* are significantly undermining food availability by diminishing crop yields through pre-harvest and post-harvest losses. The risk to food security has increased probably due to increased household size and eventually the populations that depends on smallholder sole or mixed pattern of cropping system.

The low average years of schooling for majority of household heads who could not complete primary school of 6 years of schooling have implication for extension. Education also plays an important role in household welfare since higher educational attainment is positively correlated to higher welfare while large Household size determines the availability of household labour supply.

Access to fertilizer, agro-chemicals, and improved seeds/planting materials has been proven as an important driver of agricultural production and productivity among farmers in Sub-Saharan African. Using stochastic frontier model, Mbata (1988) and Ogundele & Okoruwa (2006) observed that the use of fertilizer increased agricultural productivity of crop farming in the dry savannah and humid forest agro-ecological zones of Nigeria. Nkonya *et al* (2005) also alluded to the positive impact of fertilizer. The use of herbicides according to Mbata (op cit)), Ogundele & Okoruwa (op cit) had a positive correlation with technical efficiency or productivity of farmers. However, Tella (2006), using the Timmer and Kopp indices, revealed that the use of chemicals contributed to productivity negatively if not properly utilized.

The use of improved seeds/planting materials on agricultural productivity were also documented in studies of Adewuyi (op cit), Idjesa (2007), Ogundele (2003), Ogundele & Okoruwa (2006), and Tella (2006) in the humid forest, moist savannah and dry savannah agro-ecological zones of Nigeria. Findings of Idjesa (2007), Ogundele (2003), and Ogundele & Okoruwa (op cit)) using the stochastic frontier model revealed that the use of improved seed had a positive impact on the technical efficiencies of crop farmers. This finding was consistent with Nkonya et al (op cit), who also showed that purchased seeds had a positive impact on a farmer's productivity in Uganda. Tella (op cit), however, showed that improved planting materials when not utilized in the recommended proportion could reduce a farmer's productivity. However, the positive contribution to efficiency of farmers having access to improved planting materials could be reversed if the costs were relatively high and out of the reach of farmers. Adewuyi (op cit) using the linear programming and Tobit models observed that the high cost and inadequate supply of input (plant material inclusive) negatively affected productivity.

In terms of partnership, the approach should be a symbiotic relationship of substance between and among organisations and individuals involving shared responsibilities for the attainment of their mission, mandates and objectives. A partnership is an arrangement where parties known as partners agree to cooperate to advance their mutual interests [Business Dictionary.com].

The division of roles and responsibility depends on one hand, which specific mandate is being pursue through the partnership arrangement and on the other hand, who initiated the partnership and collaboration. If we take cognisance that those in need of extension or advice are farmers who are beneficiaries, then each partner operates in core area of expertise and mandate where the comparative advantage is high. The approach to partnership must be that both partners take active part by making it participatory (in which both the partners take an active role); problem-focused (on the extension

partners} and target-group oriented (in which the content are made to suit the peculiar circumstance of the extension partners). Since the different components of the knowledge system are interdependent, with multiple feedback processes and mutually reinforcing learning pathway, no single actor controls the system, and different actors specialise in generating knowledge about different aspects of food systems.

According to Lubell et al, (op cit), over the last century, agricultural knowledge systems have evolved to feature networks of actors with widely distributed and specialised expertise. Extension programmes need to manage these systems in ways that maximize the synergy between experiential, technical, and social learning (Lubell et al, (op cit). The Agricultural knowledge system is supported by the different learning pathways. The technical learning pathway is the first one which could be obtains through participation in outreach and extension education programme. This is the traditional meaning of knowledge transfer to farmers. Secondly, social networks between farmers and other stakeholders represent a social learning pathway, where farmers learn from each other and from the other knowledgeable actors within the system. Many participatory programmes catalyse the formation of social networks and learning, providing opportunities for social interaction (Lubell & Fulton 2008). Third, the experiential learning pathway is activated when individual farmers make decisions based on their belief systems, and then adjust their behaviour over the time in response to the feedback (Lubell et al, 2013). According to Wasserman & Faust (1994), social networks consist of “nodes” representing farmers and other agricultural system stakeholders and connecting “links “representing social relationships of different actors. While social networks have always been important in agriculture, they have remained implicit and under-researched as a part of outreach and extension (Wood et al, 2014).
and sorghum value chains for employment/income generation and food security, especially among some of the country’s poorest and most vulnerable populations.

5. CONCLUSION

The paper has revealed that partnership as a strategy could enhance the University-based outreach extension. The effort of the University for establishing the outreach was not only to serve as remedial measures for the rural communities in terms of access to agricultural innovation but also to bring to promote the University to the general public as a lifelong learning institution which creates and offer training programmes.

However, the Centre has to cultivate effective partnerships and collaborations as a culture with identified partners to bring about the expected successes and opportunities for wider public to appreciate the Centre for Agricultural Research and Extension Services contribution to food security and rural livelihoods.

In general, the paper provides lessons on how partnership with relevant organisations could greatly alleviate the socio-economic challenges of smallholders’ farmers in a sudano/sahelian savannah ecosystem.

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Back to Table of Contents

ENCROACHMENT OF RANGELANDSBY EURYOPS FLORIBUNDUS IN CHRIS HANI MUNICIPALITY.

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Back to Table of Contents

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ENHANCING THE POTENTIAL OF WOMEN IN FAMILY FARMING FOR POVERTY REDUCTION AND FOOD SECURITY.

Msila, V. A.[60] & Mkafula, T. P.[61]

THIS PAPER WAS NOT AVAILABLE AT THE TIME THE PROCEEDINGS WAS PRODUCED.

Back to Table of Contents

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TUGELA FERRY IRRIGATION SCHEME AS ANCHOR OF LOCAL ECONOMIC DEVELOPMENT ACTIVITIES IN MSINGA, KWAZULU-NATAL.

Vilakazi, N. C.,[62] Dinga, S. S., Ngubane, T. I. & Hlatshwayo, P. P. K.

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ABSTRACT

Tugela Ferry irrigation scheme in Msinga local municipality has 729ha with about 1800 beneficiaries. The scheme is made up of 7 blocks, each block operates autonomously but collaborate in water management and bulk purchasing. They are mainly producing vegetables and green mealies for consumption and selling. One or two blocks are serviced by a dedicated extension official from the local government office. The purpose of the study was to assess the potential of using Tugela Ferry irrigation scheme as anchor of local economic development in Msinga. Sixty farmers were randomly selected for face to face interview to assess, their economic status and their participation in economic development in the area. Results indicated that 90% of their main market is local (traders who sell on the roadside), these local clients spend their money in Msinga therefore boosting the local economy. They also indicated that 80% of their clients are stable and known to them and sometimes sell to them on credit. Results also revealed that recent investment by various government departments in storage sheds, new and improved irrigation, has increased farmers' capacity and productivity in the area. According to local municipality observation 50% of Msinga economy revolves around Tugela Ferry irrigation scheme. Tugela Ferry irrigation scheme if well-developed and extension service being strengthened has the potential of being centre of local economic development and create much needed jobs in Msinga

1. INTRODUCTION

The Scheme was constructed in 1889 to early 1900 and is situated near to the town of Tugela Ferry in KwaZulu-Natal. Plots measuring 1000 m^2 (0.1ha) were originally allocated to households based on the traditional methods of allocating land in the KwaZulu traditional authorities. The Scheme is 729ha in extent with seven discrete irrigation Blocks. The seven blocks of the irrigation scheme fall under three traditional authorities and five municipal Wards. This creates a high degree of complexity in terms of governance and dissemination of information from the scheme to the numerous authorities. It is estimated that there are between 1800 and 2000 farmers involved in the irrigation scheme. Many farmers operate with four panels with an average size of 0.1ha which equates to a farm size of 0.4ha. The farming models developed in this report are based on a 0.4ha farming unit. The majority of farmers that are involved in the scheme are either illiterate or with some basic primary education. The majority of people in the communities surrounding the Tugela Ferry Irrigation Scheme (TFIS) depend on social grants, wage employment, remittances and small informal sector enterprises. The Scheme makes a significant contribution to household income and subsistence when water is consistently available. The majority of farmers are good vegetable growers.

2. RESEARCH PROBLEM

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Msinga is one of the deep rural areas found in the province of KwaZulu Natal located under the Umzinyathi district. Although Msinga is one of the dry places in the district, the perennial Tugela River makes Msinga to heavily participate in vegetables and crop production all year round. +/- 1800 small holder farmers produce vegetables and crops in the Tugela Ferry Irrigation Scheme. The problem that the study seeks to address is that can the Tugela Ferry Irrigation Scheme be regarded as an anchor for local economic development in Msinga? Therefore, the purpose of the study was to assess the potential of using TFIS as anchor of local economic development in Msinga.

3. RESEARCH OBJECTIVES

- To evaluate the smallholders' production status in TFIS in ha
- To evaluate whether farmers have market for their produce
- To evaluate the economic impact of farming on their livelihood
- To investigate the role of stakeholders in supporting the scheme

4. LITERATURE REVIEW

According to DAFF (2011) productivity in the irrigation scheme is not stable, but it keeps on fluctuating due to water availability, pest and diseases outbreak which harmer the productivity for example tuta absoluta and fall army warm. Through mechanisation interventions there is an increase in production (DAFF, 2011).

(Cousins, 2012:18) indicated that 30-40 female hawkers in Tugela Ferry town are supported by the scheme. The movement components of the fresh produce value chain contribute in creating a small number of employment opportunities within the scheme.

According to the IDP (2015/2016) the department of local government play a major role in promoting agricultural production specifically crop production this has resulted in the development of the economy of the municipality by 12.5%.

Access to irrigation enables farmers to adopt new technologies and intensity cultivation, leading to increased productivity, overall higher production and greater returns (Sinyolo, 2012:25)

5. RESEARCH METHODOLOGY

The study was conducted in the TFIS located in Msinga. A quantitative study was conducted to collect data on the evaluation of Tugela Ferry Irrigation as an anchor activity in Msinga for local economic development. Sixty smallholder farmers producing in Tugela Ferry Irrigation Scheme were randomly selected and interviewed. Survey questionnaires were used to collect data from the smallholder farmers. In-depth, structured interviews were used to collect data. The data was analysed using the descriptive statistics

6. RESULT AND DISCUSSION

Below is the discussion of result on the research that aimed at investigating where Tugela Ferry Irrigation Scheme can be used as an anchor for local economic development activities in Msinga.

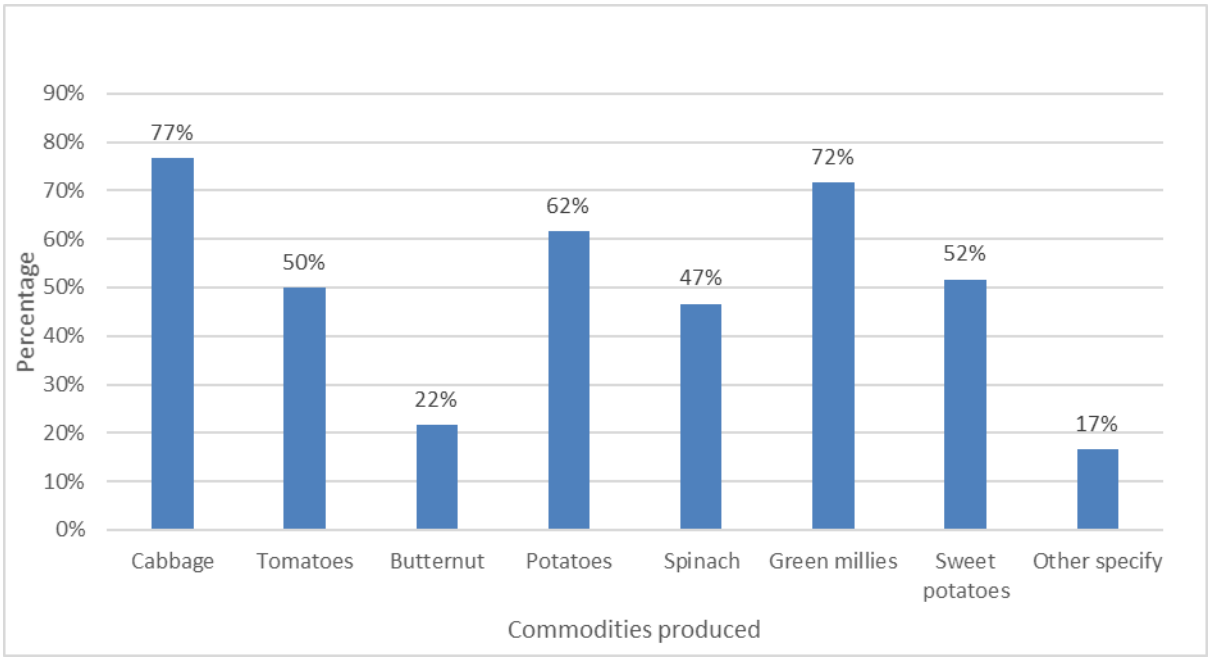

Figure 1: Commodities produced in TFIS

As shown in figure 1, the most produced commodities in Tugela Ferry Irrigation Scheme are cabbage 77%, tomatoes 50%, butternut 22%, potatoes 62%, spinach 47%, green mielies 72%, sweet potatoes 52% and others 17%. From these result cabbage, green micelles and potatoes are most predominantly produced commodities in Tugela Ferry Irrigation Scheme.

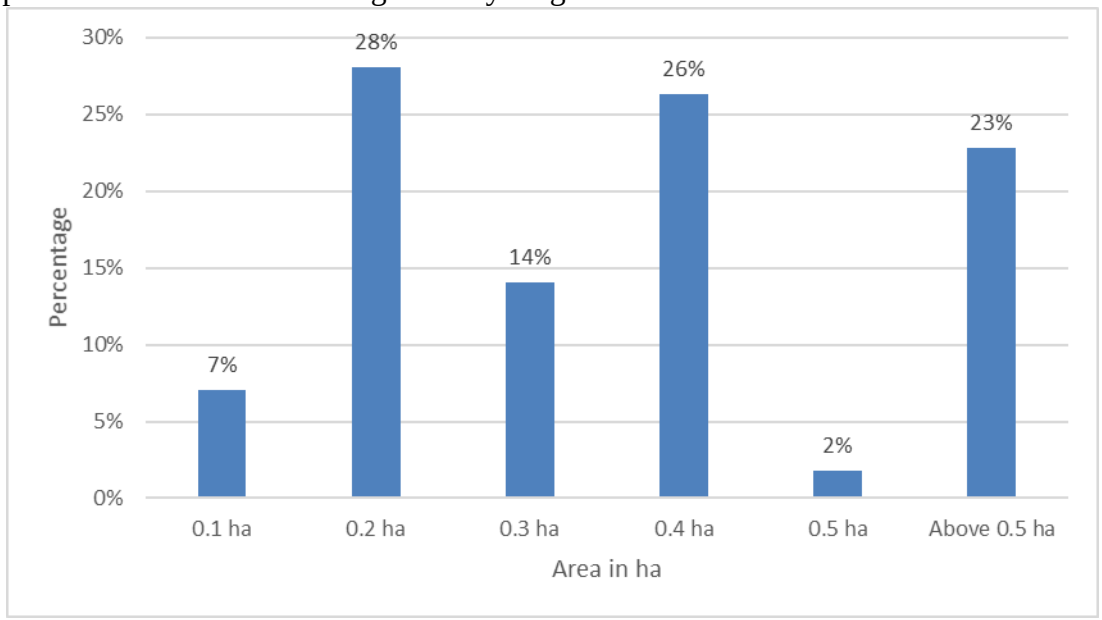

Figure 2: Area of production in ha

As indicated in figure 2: 28% of the smallholder farmers produce in 0.2 ha, 26% produce in 0.4 ha, 23% produce in area that is above 0.5 ha. Most farmers are using 0.4 ha on average.

Table1: Percentage of food used for household consumption

Household consumption quantities	Frequency	Percentage (%)
All	0	0%
10%	41	68%
20%	12	20%
50%	4	7%
80%	3	5%
Total	**60**	**100.0**

As shown in table1, 68% of the farmers use only 10% of the produce for home consumption, 20% use only 20% of the produce is used for household consumption, only 12% of the farmers consume more than 50% in their home stead. 88% of the farmers produce for the market since they consume 10% to 20% of their produce.

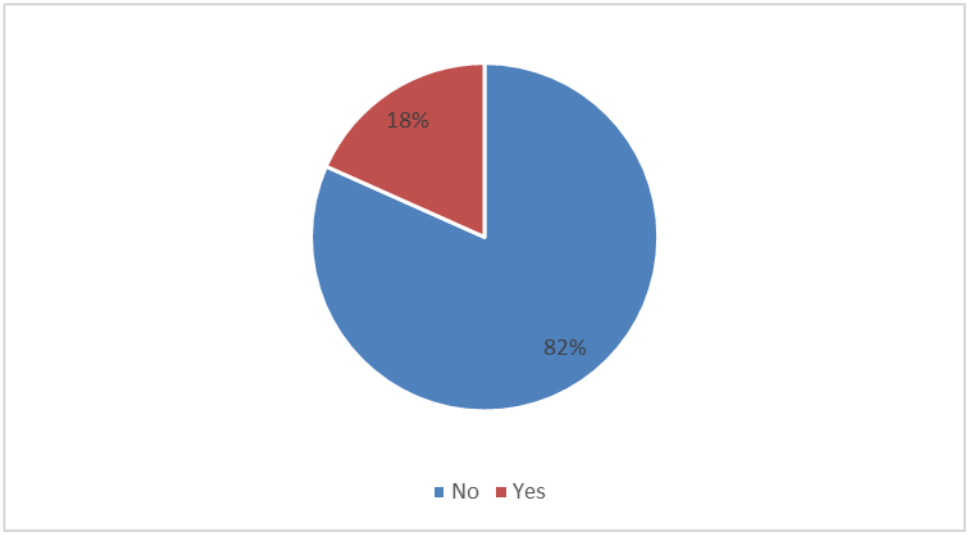

Figure 3: market for the produce

Eighty two percent of the farmers indicated that they do not have stable market for the produce, only 18% indicated that they have market for their produce. One can conclude that market is still a challenge to small holder farmers in Tugela Ferry Irrigation Scheme.

Table 2: Selling of the produce

Selling of produce quantities	Frequency	Percentage (%)
All	1	1.6%
10%	1	1.6%
20%	0	0%
50%	6	10%
80%	45	75%
90%	7	11.6%
Total	**60**	**100.0**

As shown in table 2: 75% of the smallholder farmers sell about 80% of their produce, 10% sell 50% of the produce, 11.6% sell 90% of the produce, only 1.6% sell all the produce, and also 1.6% sell 10% of their produce.

Table 3: Type of market that farmers use

Type of market	Frequency	Percentage (%)
Formal market	3	5%
Informal market	54	90%
Both formal and informal	8	13%
Total	**60**	**100.0**

Five percent of the farmers use the formal market to sell their produce, 90% indicated that they solely depend on informal market to sell their produce, 13% of the farmers indicated that they use both formal and the informal market. Based on these results it is clear that most of the smallholder farmers in Tugela Ferry Irrigation Scheme use informal markets to sell their produce.

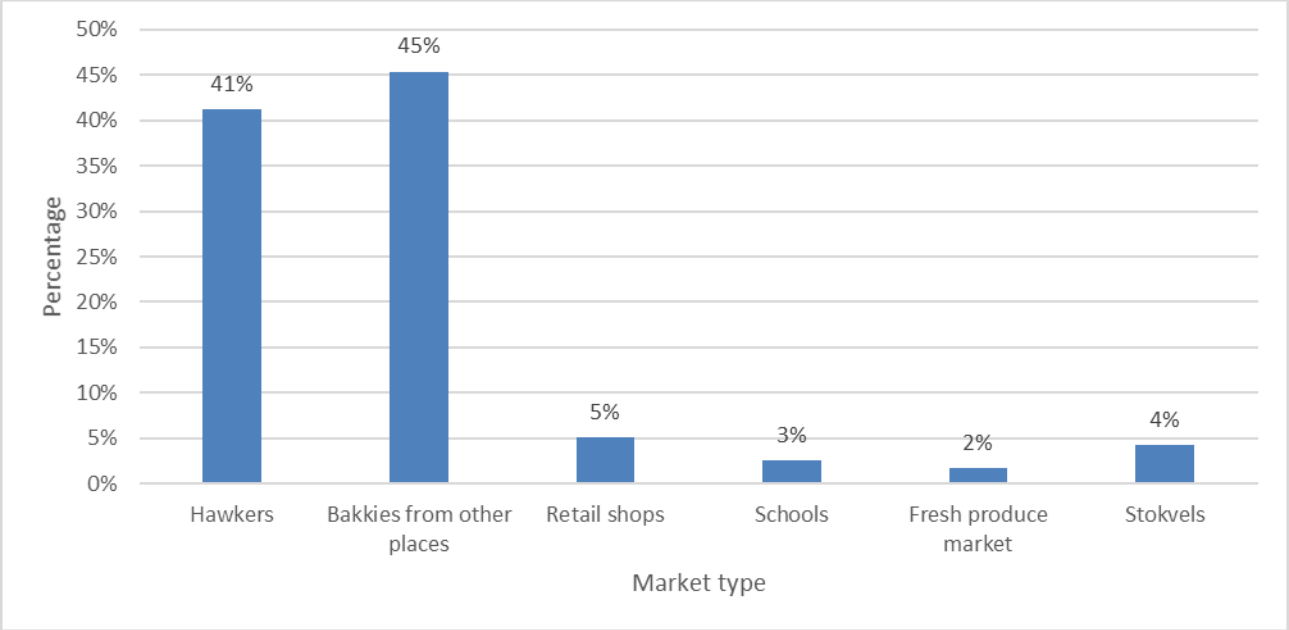

Figure 3: Customer description

Forty five percent of the produce is sold to bakkies which comes from other places, 41% of the of the produce is sold to hawkers, 5% is sold to retail shops, 3% is sold to local schools, 2% is sold to fresh produce market, and 4% is sold to stokvels.

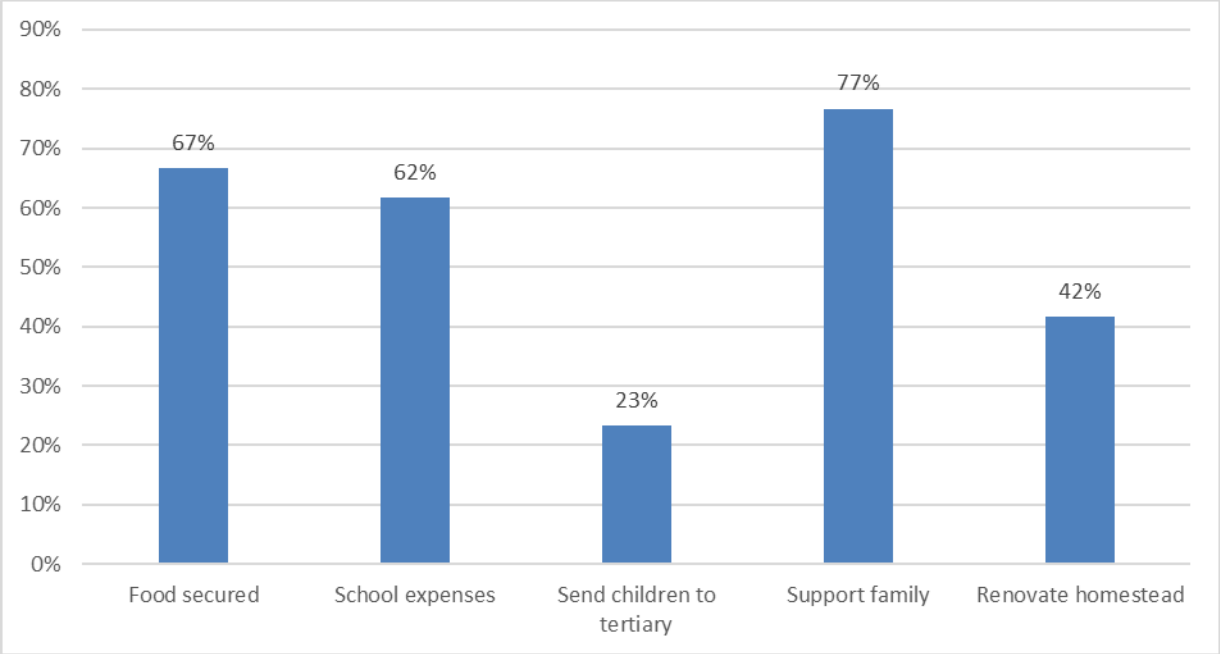

Figure 4: The assistance received from farming

As indicated by figure 4: 77% of the smallholder farmers are able to support their families, 67% are food secured through farming, 62% have been able to send their children to school, 23% have managed to send their children to tertiary institutions, and lastly 42% have managed to renovate their homestead through farming.

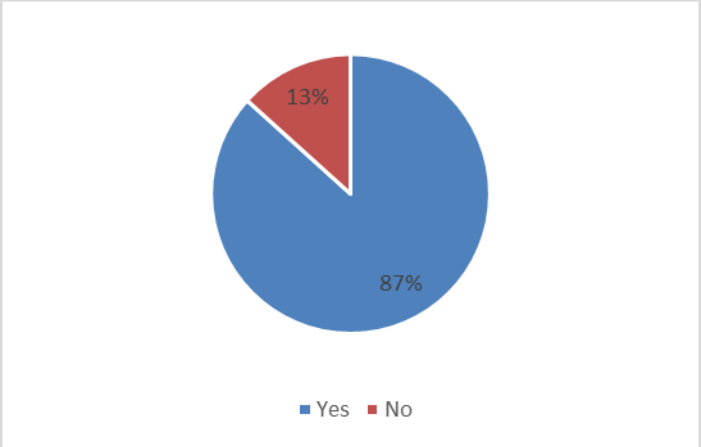

Figure 5: Life improvement through farming

Eighty seven percent of the farmers indicated that there is huge improvement in their lives, while 13% indicated that they have recently started farming they have not noticed any improvement yet.

Table 4: Hiring of people

Do you hire people	**Frequency**	**Percentage (%)**
Yes	44	73%
No	16	27%
Total	**60**	**100.0**

Seventy three percent indicated that they hire people during production, while on the other hand 27% highlighted that they do not hire people. One can conclude that through the operation of the Tugela Ferry Irrigation Scheme people do get seasonal employment.

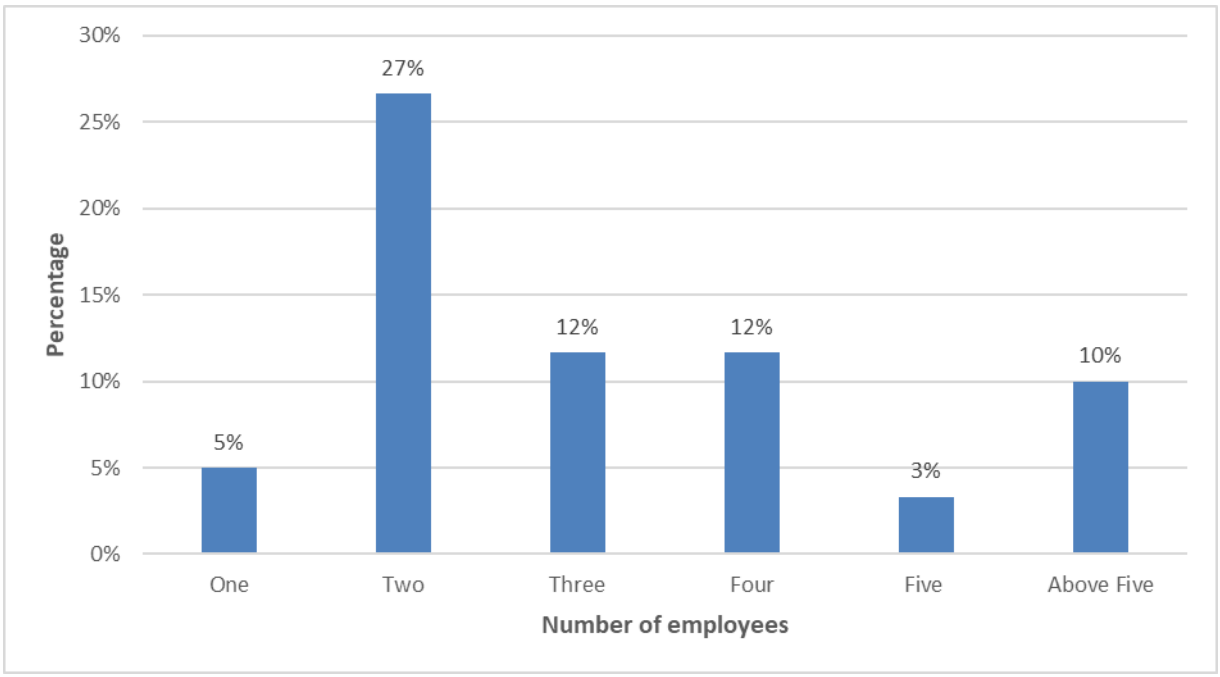

Figure 6: Seasonal employment

As shown in figure 6: 27% of the farmers indicated that they hire two people to assist during production, 12% indicated that they hire three people, another 12% indicated that they hire four people to assist during production, 13% indicated that they hire five and above seasonal employees. This study clearly indicates that a minimum of two employees are hired by farmers during production.

Table 5: Stakeholders which support the TFIS are:

Stakeholder name	Type of support	Percentage of support
DARD	• Production inputs • Scientific & Technical advice • 7 tractors with implements (on 3 years lease)	40%
Msinga Local Municipality	• Provide mechanisation services at a cost • Sponsor farmers days • Build a processing plant for value adding • Shipping containers for storage • Cladded shad • Tractor depot • Simple pack shad	20%
Rural Development and Land Reform	• Irrigation Scheme Rehabilitation • Production inputs • Promised Three tractors with implements	40%

7. CHALLENGES

- Water insecurities
- High illiterate levels have a negative impact on record keeping
- Constrains of using new technology
- High dependency syndrome to extensionists

8. RECOMMENDATIONS

Stakeholders need to help the farmers to increase the market share in the formal market. An agro-processing plant need to be established and farmers need to be trained on value adding to ensure that farmers participate in the whole value chain. Linking farmers to Radical Agrarian Socio Economic Transformation (RASET) programme so that they can have stable markets for their produce.

9. CONCLUSION

If there is a land tenure system in place for farmers that lend land from others there will be a possibility for those farmers upgrade from smallholder to commercial farmers. Larger land ownership will lead to sustainable job creation rather than of seasonal jobs. Stereotypic mindset for cash on hand fails the market. Giving enough support from stakeholders, finding a secured market for the produce, and obtaining full participation from farmers the Tugela Ferry Irrigation Scheme can be an anchor for local economic development activity in Msinga.

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Back to Table of Contents

SEASONAL CHANGES IN THE POPULATION OF GASTROINTESTINAL PARASITES OF SHEEP IN THE COMMUNAL FARMING AREAS OF INXUBA YETHEMBA.

Dastile, M.[63]

1. BACKGROUND

- In many countries particularly, small ruminants play a great role in the economy of the country, as a source of meat, milk, fibre, cash income, and skin and they live in extreme climatic conditions.
- Parasites are a major problem on animal productivity throughout the world.
- Causes decrease in survival, live-weight gain, wool and milk production and reproductive performance.
- These losses can be particularly severe in developing countries where control measures are less readily available.
- It varies so greatly between countries and between regions, depending both on climate and on the intensiveness of farming in the area.
- Related to the agro-climatic conditions like quantity and quality of pastures, temperatures, humidity and grazing behaviour of the host.
- Sheep have numerous gastro intestinal parasites and the most important include *coccidia* (protozoa), nematodes (roundworms), *cestodes* (tapeworm), and *trematodes* (flukes).
- As in African society's animals on the white owned farms were usually kraaled each night to safeguard them from the predators, straying and theft. Vets condemned kraaling for spreading diseases because large number of animals are huddled together nightly.
- Where sheep or goats have to be penned for lengthy periods there can be a fatal build-up of larvae on the grass growing in the pens. Sheep become hungry overnight and will eat any grass present. In consequence they will ingest massive numbers of larvae. The barberpole worm (*Haemonchus contortus*), is generally considered to the most important.
- The blood sucking parasite *H. contortus* which is found in the abomasum of sheep and goats causes significant blood losses; each worm removes 0.05ml per day so that sheep with a 500 *H. contortus* may loss about 250ml per day, resulting in decrease in erythrocytes, lymphocytes, haemoglobin, Packed Cell Volane (PCV), body weight and wool growth. (Gadahi et al., 2009)

2. JUSTIFICATION

- The South African government is greatly concerned about the status of the health of livestock particularly of those belonging to resource poor farmers experience serious animal disease related problems.
- Gastro intestinal infections, particularly with *haemoncus contortus* constitute one of the most important constrains to small ruminant production.
- The situation is more critical in areas which levels of animal production are poor and farmers have limited access to relevant information and remedies.
- The Livestock production plays a vital role in food security and poverty alleviation on rural areas

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- The outcomes of this study were to be used as the control and management tool on the communal rural areas.

3. AIM AND OBJECTIVES

Aim

- To determine the Seasonal occurrence of gastro intestinal parasites of sheep in the arid zone of the Eastern Cape.

Objectives

- To establish the seasonal occurrence of Gastro Intestinal (GI) parasites of sheep.
- To compare the seasonal occurrence, population of GI parasites over the years.
- To develop a health management protocol for managing internal parasites in sheep.

4. MATERIALS AND METHODS

4.1 Study site

- The study was conducted at Cradock in the Eastern Cape province of South Africa, in the Great Karoo. It falls under the Inxuba Yethemba Local Municipality, in the Chris Hani District Municipality.
- Siviwe commonage was randomly selected for the study
- The vegetation and landscape consist of flats and gently sloping plains, dominated by dwarf microphyllous shrubs, with 'white' grasses of the genera Aristida and Eragrostis.

4.2 Sampling technique

- During the study 30 female sheep (2-tooth) were randomly was selected.
- Animals were tagged for identification.
- At the beginning of the trial all sheep was drenched with a broad spectrum remedy (Seponver plus) to standardize the egg count of internal parasites.
- Feacal samples were collected monthly from the rectum over a period of four years.
- Collected samples were placed on a cooler box with ice packs and dispatched to provincial laboratory for analysis (Modified Mc Master technique).
- Sheep were only dosed when the feacal internal parasite egg per gram (e.p.g) counts exceed the average level of >3000 for roundworms and >10 000 for coccidia.
- An epidemiological questionnaire was used to ascertain from farmers regarding animal health practices, the type of supplementary feeding used and what veld management practices were applied.

5. RESULTS

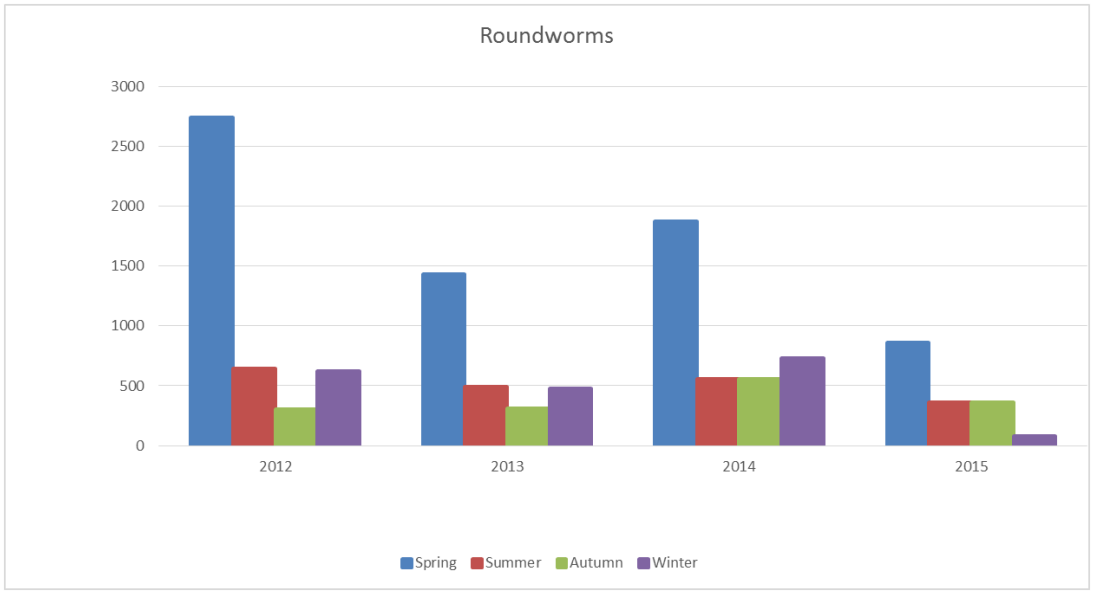

Figure 1: Incidence of round worms in sheep in the study area.

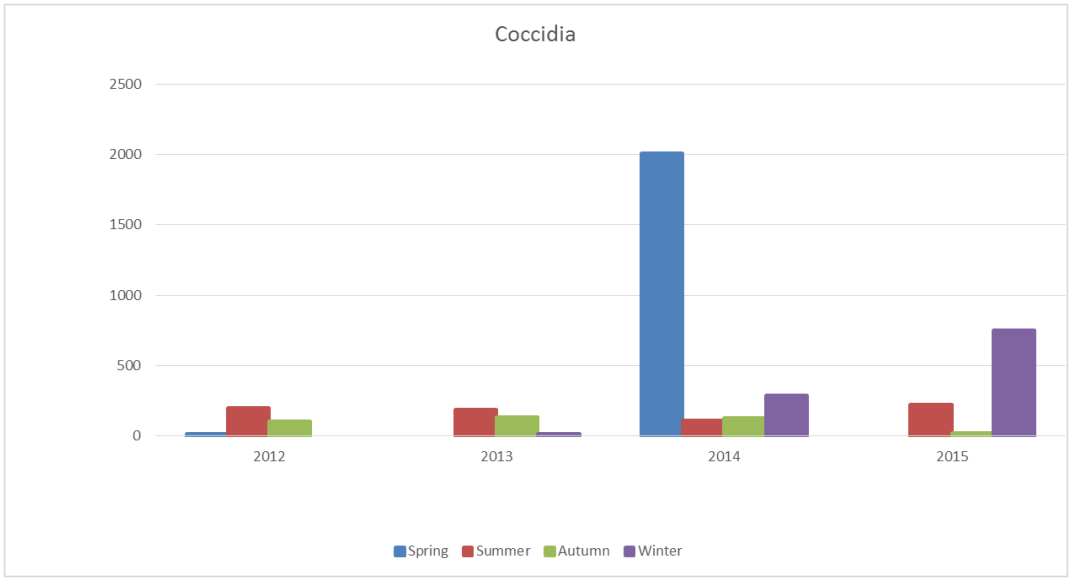

Figure 2: Incidence of coccidia in sheep in the study area.

- Roundworms levels were significantly higher in spring over the years when compared to other seasons
- Roundworms were also higher in the summer months
- Roundworms levels were lower in Autumn
- Roundworms were also lower in winter months
- Coccidia was higher in spring
- Coccidia was also higher in winter
- Summer and autumn were having lower levels of coccidian over the years

6. CONCLUSION

- Sheep need to be dosed with broad spectrum remedy mostly in the spring as roundworms are highly prevalent in the seasons.
- Dosing should be also be done for roundworms in early summer.
- Dosing remedies need to be altered to avoid build up resistance in wire worm.

7. RECOMMENDATIONS

- Numerous techniques can be used to control parasitism. Pasture management should be primary tool to control internal parasites.
- Decreasing the stocking rate decreases the number of worms spread on the pasture.
- Grazing sheep and goats with cattle, or in rotation with cattle, can also reduce internal parasite problems. Cattle do not share the same internal parasites with sheep. Cattle consume sheep and goat's parasite larvae, which helps clean the pasture for the small ruminants.

Back to Table of Contents

SIXTH SESSION.
SMALLHOLDERS' FARMERS' EXPECTATION AND PERCEPTION OF SERVICE QUALITY IN COMMERCIAL BANKING IN AMATHOLE DISTRICT.

Agholor, A. I.[64]

ABSTRACT

The measurement of service quality and satisfaction outcome derived by smallholder farmers has been diverse and still remain a focal issue in the contemporary public discourse. The commercial banks are accountable for smallholders' farmers' level of satisfaction, in terms of service quality which focuses on assessment that echoes the observation of reliability, assurance, responsiveness, empathy and tangibility. Thus, the study investigated the outcome of perceived service quality and satisfaction of smallholder farmers with the commercial banking sector in Amathole Local Municipality. Relationship between the dimensions of SERVQUAL approach and smallholder farmers' satisfaction were also examined. The paper used the structured questionnaire which consist of a prepared question-items with fixed answers and alternatives in line with the stated objectives of the study. In assessing smallholder farmers' expectation, perception and satisfaction of service quality; the paper adapted the psychometrically tested SERVQUAL model: Tangibles, Empathy, Responsiveness, Reliability and Assurance to assess the level of service quality and satisfaction. Finding reveal that the closer the perception score to expectation score, the higher the perceived level of quality service. However, the overall assessment of smallholder farmers' expectation exceeds the perceived service that was given by selected commercial banks. Furthermore, results reveal that there are significant relationships between the two items: Tangibility and Reliability, and smallholder farmers' satisfaction (p-value = 0.008). The paper recommended that rendering of quality services requires a rational approach and training of bank staff to enhance improvement that will contribute to encouraging smallholder farmers to stay loyal and avoid switching banks.

Keywords: Measurement, Performance, Customers, Gap-difference, Service providers.

1. INTRODUCTION

The delivery of services by implication is the sum total of all actions put in place by firms that allows for the maintenance of cordial relationship between enterprises or businesses and their customers. In the main, customers' happiness and satisfaction remains the focal objective of the banking sector. In Amathole Local Municipality, smallholder farmers are patent in the retail banking sector. Brink and Berndt (2004) describe 'service' as any benefit that one party can offer to another that is essentially intangible and does not result in the ownership of anything. On the other hand, Zeithaml, Bitner & Gremler (2006), posited that 'service' entails the totality of all economic activities that jointly collaborate in creating customers' satisfaction. This implies that financial services rendered by commercial banks need to be evaluated on an on-going basis because they create relationships between the banks and their clients. Service denotes composite actions put in place by firms that maintain a relationship between enterprises and their customers. Meanwhile customer satisfaction is

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viewed as the primary objective of most successful businesses, thus service quality needs to be evaluated to establish and quantify the success rate and satisfaction derived by customers. Many writers have made frantic effort to measure overall customer satisfaction (Brink & Berndt 2008) and particularly smallholder farmers' satisfaction about service quality received from banks. The term quality describes the features of products and services that comply with the standard earmarked. Owing to the unceasing increases in retail banks competition, it becomes imperative for retail banks to exhibit a quality service model capable of encouraging smallholder farmers.

In the face of numerous competitions, commercial banks continuously thrive to entice smallholder farmers and other banking clients from switching banks through good-looking products and services. The fact that commercial banks gives indistinguishable products and services makes it extremely difficult to identify the factors that push smallholder farmers to switch from one bank to another. In the contemporary banking environment coupled with advanced technology in the banking systems, it becomes imperative for commercial banks to develop an ideal service uniqueness. Balachandran (2005) posited that commercial banking sector in the present day should be of world-class standard and committed to superiority in client satisfaction. Smallholder farmers and other banking clients desire acceptable quality services and satisfaction (Niveen & Demyana 2013).

There are numerous commercial banks in South Africa with rife competition and in order to win clientele loyalty these commercial banks must remain focus on customers' needs and satisfaction. Customers' satisfaction is considered to be based on customers experience of a particular service rendered. Cronin & Taylor 1992 posited that service quality is the primary determinant of client satisfaction, because service quality is derived from the outcomes of the services rendered by service providers in any business. The type of Service quality rendered has the potentials to either guarantee smallholder farmers satisfaction or allows for switching of banks. Service quality is known for its potential in guaranteeing client satisfaction and retention, operational efficiency and profitability of an enterprise (Cronin & Taylor, 1992) Since consumer satisfaction is based on the experience of a particular service encounter (Cronin & Taylor, 1992), it becomes apparent that service quality is a basic determinant of customer satisfaction. Oliver (1993) asserted that service quality is a precursor of customer satisfaction, irrespective of whether the services were collective or transaction-specific. Smallholder farmers' or client satisfaction has a robust positive relationship with client retention in the commercial banking sector (Kandampully & Suhartanto, 2000). This bonded relationship cascades to smallholder farmers recommending banks to other potential farmers thus increasing steady client base of commercial banks. Cohen *et. al* (2007) states that a loyal bank customer is less likely to be disturbed about bank charges. In a similar vein, Reichheld, Markey, & Hopton, (2000) stated that organizations that enjoys high level of customers' loyalty, experience twice as much customer progression.

2. CONCEPTUAL FRAMEWORK OF THE STUDY

The measurement of service quality and satisfaction outcome derived by smallholder farmers has been diverse and still remain a focal issue in the contemporary social discourse (Agholor et.al, 2013). The commercial banks are accountable for smallholders' farmers' level of satisfaction, in terms of service quality which focuses on assessment that echoes the observation of reliability, assurance, responsiveness, empathy and tangibility (Wilson, et al., 2008). In measuring service quality, numerous models have been applied with diverse views and conclusions. Firstly, the Expectancy-Disconfirmation model is centred on recognising clients' expectation as against what they experienced. It compares the services carried out in harmony with clients' expectations, (Oliver 1993) which is usually evaluated after services has been given. Secondly, another model of note is the Performance-Only model which proposes the assessment of service quality by questioning the

client about the level of satisfaction derived from service encounter (Cronin & Taylor, 1992). Thirdly, according to Gronroos (1984), the Technical and Functional dichotomy model recognises two service dimensions (technical value of the product which is centred on product features such as durability, safety, physical structures; and functional quality which is also centres on the interactions between service provider and the client such as politeness, swiftness of service delivery and expediency) that lead to clients satisfaction. In the Technical and Functional dichotomy model, information may be inadequate and therefore, clients are abound to rely on functional quality to form opinions about quality of services received (Donabedian, 1980). Fourthly, the Service Quality versus Service Satisfaction model exposes two service dimensions that are interconnected (the transition-specific valuation which assesses definite features of quality and the general assessment which assesses the entire quality). This model connects the assumed quality given immediately after service encounter and the overall satisfaction derived after the service has been rendered (Gilbert *et al.*, 2004). Another model called Service Performance propounded by Cronin & Taylor in 1992, which disregarded clients' expectation but accentuated on clients' overall frame of mind towards a given service or services were also adopted in measuring in service quality.

The most accepted model for measuring service quality is the SERVQUAL model propounded by Parasuraman, Zeithaml and Berry in 1988. This model initially provided ten elements of service quality which includes: Access, Communication, Competence, Courtesy, Credibility, Reliability, Responsiveness, Security, Understanding and Tangibility. From the foregoing, more studies merged which grouped existing elemental variables together and reduced them to five amalgamated dimensional variables as: (1) Tangibility: the appearance of the business reps, facilities, resources, and as well as communication tools, (Davis, Acquilano, & Chase 2003) summarised as the physical evidence of the service); (2) Reliability: provision of services to the client at the assured time while upholding error-free activities. (Fitzsimmons & Fitzsimmons 2001); (3) Responsiveness: this is a measure of the willingness and speed of delivery of service by an employee coupled with the ability of the firm or business to respond timeously to client service requests, with minimal waiting and queuing time (Niveen & Demyana 2013); (4) Assurance: this is ability an employee to express trust and competence to perform assigned task, it encompasses, politeness and the general attitude towards service delivery (Fitzsimmons & Fitzsimmons, 2001); (5) Empathy: this is the care and attention provided to the client by the firm. It entails the provision of convenient business operating hours (Ananth, Ramesh & Prabaharan 2010). The SERVQUAL model measures customers' expectations and perceptions of service quality by apprehending the gap that exist between service expectation and experience. (Parasuraman, *et. al.,* 1988; Zeithaml, *et. al.,* 1998). The paper adopted SERVQUAL MODEL to substantiate the outcome of smallholders' farmers' perception of service quality and satisfaction with commercial banking in Amathole Local Municipality. It is against this backdrop, that the study attempts to address the specific quality and service factors that accentuates satisfaction to smallholder farmers as banking customer in Amathole Local Municipality.

The main objectives of the study were to determine the outcome of smallholders' farmers' expectation and perception of service-quality and satisfaction in commercial banking.

Precisely, the study aimed to accomplish the following objectives:

- To investigate the outcome of perceived service quality and satisfaction of smallholder farmers with the commercial banking sector in Amathole Local Municipality.
- To determine whether there is significant relationship between the dimensions of SERVQUAL approach and smallholder farmers' satisfaction.

3. MATERIALS AND METHODS

3.1 Description of the study area

The study was carried out in Amathole district of Eastern Cape Province of South Africa. The choice of this area was informed by the dominance of emerging and smallholder farmers in the area. Amathole district is bounded by Chris Hani to the Northern part, OR Tambo by the North Eastern area, Indian Ocean by the South Eastern region and Cacadu to the Western part. The district has eight Local Municipality comprising of Nxuba, Great Kei, Ngqushwa, Nkonkobe, Amahlathi, Mbhashe, Mnquma and Buffalo Local Municipality of Eastern Cape (Statistics South Africa, 2014).

3.2 The research instrument

The paper used the structured questionnaire which consist of a prepared question-items with fixed answers and alternatives in line with the stated objectives of the study. However, the structured questionnaires were also appropriately tailored to the dimensions of SERVQUAL model and service Quality Gap.

In assessing smallholder farmers' expectation, perception and satisfaction of service quality; the paper adapted a questionnaire design created by Parasuraman (1988). The questionnaire instrument was therefore, divided into sections. The first part gave details of demographic characteristics of the smallholder farmers in the study area, while the second part of the questionnaire elicited information about respondents' expectation, perception and satisfaction of service quality.

The psychometrically tested SERVQUAL variables employed were: Tangibles, Empathy, Responsiveness, Reliability and Assurance to assess the level of service quality and satisfaction. The 5-point Likert scale (Likert 1932) which includes: Agree, Strongly Agree, Undecided, Disagree, Strongly Disagree were also used to measure smallholder farmers' commercial banking satisfaction and service quality.

3.3 Sampling and sample size

The paper adopted a non-probability sampling technique to allow for convenience and subjective selection of the respondents. Therefore, a sample size of 180 smallholder farmers were selected from Amathole district. The samples were collected from suburbs consisting of Nxuba, Great Kei, Ngqushwa, Nkonkobe, Amahlathi, Mbhashe, Mnquma and Buffalo Local Municipality of Eastern Cape.

3.4 Data analysis

The questionnaires were collected back through personal contact with respondents, sorted and screened for data analysis. The data was computed to show the demographic details of respondents by employing the descriptive statistics such as frequency, percentages, mean and standard deviation. Measures such as mean and standard deviation were also used to show the extent of smallholder farmers expectations and perceptions of the listed dimensions of service quality; while the total mean values represent the average value of responses of all the respondents regarding a particular item on the scale.

To determine the statistical relationship between SERVQUAL variables and smallholder farmers' perceived service quality and satisfaction, logistics regression analysis was used. The data analysis was prepared with the use of Statistical Package for Social Sciences (SPSS version 21).

3.5 The measurement

While measuring smallholder farmers expectations and perceptions in selected commercial banks, the SERVQUAL approach was adopted by using the 5-point scale to rate the level of agreement or disagreement (1 = strongly disagree, 2 = disagree, 3= undecided, 4 = agree, 5 = strongly agree). In the measurement scale 1-5, the higher number indicate higher level of expectation or perception. In this context, the expectations of smallholder farmers are dependent on the past experiences and information gathered while their perceptions are based on the definite or real service received from banks. The derived difference between perception and expectation scores (P-E) having a range of value from -5 to +5 (-5 depicts that respondents were very dissatisfied with services and +5 stands for very satisfied).

The quality score is determined by the service gap which is the degree to which expectation surpasses perceptions. The greater the positive P-E scores, the higher the level of service quality amounting to a higher level of smallholder farmers satisfaction with bank services. Therefore, satisfaction and service quality are both considered together as a functions of smallholder farmers' perceptions and expectations. Also, service quality is deemed satisfactory when perceptions and expectations are equal.

3.6 Reliability Analysis

The measures of reliability were determined in line with the classification of Cronbach's alpha co-efficient by George and Mallery (2003), which specifies strong reliability if the alpha co-efficient exceeds 0.7 and moderate reliability if the alpha co-efficient exceeds 0.6. The variables used in the study were tested and the Cronbach alpha meets the scales requirement by exceeding 0.7 (Table 1). The study therefore, has strong internal consistency and reliability.

Table 1: Reliability statistics for scale

Variables: 5 dimensions of SERVQUAL	**Cronbacha's Apha**
Reliability	0.812
Tangibility	0.918
Responsiveness	0.816
Assurance	0.823
Empathy	0.781

3.7 Ethical issues:

The entire smallholder farmers involved in this study were informed that their responses would be treated with utmost confidentiality. However, they were also informed that they are at liberty to decline participation at any stage of the study. Therefore, the consent of all respondents that took part in the study were not compromised in any way.

4. RESULTS AND DISCUSSIONS

4.1 Demographic characteristics of smallholder farmers'

The demographic characteristics of respondents provided in Table 1 shows that 15% fall into the age bracket of between 25-34, while the age group of 35-44, 45-54 and greater than 55 years old were 19.4%, 29.4 % and 36.1% respectively. The level of education of respondents depicts that 3.3% had no formal education while 31.7% had primary education. In the junior and high school category, respondents had 16.1% and 22.2% respectively. Overall, the respondents with tertiary education were 26.7%. Smallholder farmers' average farm income were skewed and justifies the subsistence

level of production. However, respondents with income less than R6000 were 7.8% while 57.8% and 17.8% were at income level of R6000-11000 and R1200-R19, 999 respectively. Respondents with more than 25 years farming experience were 26.7% while 32.2% had farm experience ranging 11-15 years and 13.8% had farm experience ranging from 16-20 years. Respondents with 6-10 years farm experience were 5.5%.

Table 2: Demographic characteristics of smallholder farmers in Amathole district

Age in years	No	Percentage
25-34	27	15
35-44	35	19.4
45-54	53	29.4
≥54	65	36.1
Level of Education:		
No school	6	3.3
Primary school	57	31.7
Junior school	29	16.1
High school	40	22.2
Tertiary	48	26.7
Income:		
< R6 000	14	7.8
R6 000-R11 999	104	57.8
R12 000- R19 999	32	17.8
Farm Experience in years:		
6-10	10	5.5
11-15	58	32.2
16-20	25	13.8
21- 25	39	21.6
≥25	48	26.7

4.2 Smallholders' Farmers' Expectation and Perception of Reliability of Service

The measurement of the clients' Reliability expectation of service quality is presented in Table 2. The item 'promises are fulfilled by banks to deliver services at an agreed time' recorded a mean score of 4.52 for Expectation and 3.21 for Perception; with a negative gap difference (Perception – Expectation) of -0.34. The variable items that recorded the highest mean Expectation were 'banks are reliable for safe keeping of deposits with 3.59 and the item 'irrespective of power outrage banks delivers services punctually' scored 3.37 with gap difference of -0.16 and -0.04 respectively. However, overall average summation score was 3.55 for reliability expectation and 3.40 for reliability perception with a negative gap difference (P-E) of -0.81. The implication here is that, banks requires improvement to meet the expectations of smallholder farmers. This finding lead credence to the theory of Parasuraman et al. (1988) which postulates that there is need for firms to make effort towards improvement when clients expectation exceeds the perceived services rendered. In another study, Kumar, Kee & Manshor (2009) asserted that customer service sessions at commercial banks must continuously be exposed to training and refreshers programmes to improve competencies in service delivery.

Table 2: Smallholder farmers' satisfaction Aspect: Reliability concept

Reliability Expectation			**Reliability Perception**		
Variable Items	**Mean**	**STD**	**Variable Items**	**Mean**	**Gap diff**
Promises are fulfilled by banks to deliver services at an agreed time.	4.52	0.367	Promises are fulfilled by banks to deliver services at an agreed time.	3.21	-0.34
Records are kept by banks accurately.	3.40	.0432	Records are kept by banks accurately.	3.11	-0.18
Banks notifies farmers exactly when services will be carried out.	3.36	0.412	Banks notifies farmers exactly when services will be carried out	3.22	-0.17
Irrespective of power outrage, bank delivers services punctually.	3.37	0.472	Irrespective of power outrage, bank delivers services punctually	3.37	+0.04
Banks are reliable for safe keep of my deposits	3.59	0.375	Banks are reliable for safe keep of my deposits	3.44	-0.16
Average summation	**3.55**	**0.43**	**Average summation**	**3.40**	**-0.81**

The Tangibility concepts encompassing the appearance of the available facilities, equipment, personnel and materials used for communication are presented in Table 3. The Tangibility expectation mean score for the item 'modern equipment available for banking services' indicate a mean score of 3.64 with standard deviation of 0.43 and Tangibility Perception of 3.23. The Gap difference (P-E) recorded was -0.41 which shows that the service provider needs improvement on the item as indicated on Table 3. The average total of all items was 3.35 for Expectation and 3.06 for Perception with Gap difference of -1.16. The results indicated that smallholder farmers placed high premium on latest equipment and facilities for expected services. This phenomenon could be attributed to the fact that respondents have higher expectations on tangibles ITEMS primarily because of awareness and increasing levels of technology.

Table 3: Smallholder farmers' satisfaction Aspect: Tangibility concept

Tangibility Expectation			**Tangibility Perception**		
Variable Items	**Mean**	**STD**	**Variable Items**	**Mean**	**Gap diff**
Modern equipment available for banking services.	3.64	0.43	Modern equipment available for banking services	3.23	-0.41
Banks infrastructures/physical facilities like ATMs, Tellers and Vaults should be attractive.	3.55	0.47	Banks infrastructures/physical facilities like ATMs, Tellers and Vaults should be attractive	3.10	-0.45
Bank's staff should be formal in dressing.	3.21	0.33	Bank's staff should be formal in dressing.	3.03	-0.18
During financial difficulties, the bank should be able to understand and reassure clients.	3.01	0.39	During financial difficulties, the bank should be able to understand and reassure clients.	2.89	-0.12
Average summation	**3.35**	**0.405**	**Average summation**	**3.06**	**-1.16**

In Table 4, the Responsiveness aspect which is the 'readiness to assist customers in various dimensions' recorded a mean expectation score of 4.25 and mean perception score of 4.13 with Gap difference (P-E) of -0.12. The second variable item - 'bank employees seldom provided services to customers' also recorded a mean score for Expectation and perception of 4.51 and 4.46 with Gap

difference of -0.50. The overall summation of the average of all variable items indicate that service quality levels of responsiveness fails to meet the expectations of smallholder farmers. The readiness of bank staff to support customers is important since most smallholder farmers may not be very familiar with modern technology used by banks. Therefore, the need for developing a supportive culture is important for service providers like banks (Legcevic 2008).

Table 4: Smallholder farmers' satisfaction Aspect: Responsiveness concept

Responsiveness Expectation			**Responsiveness Perception**		
Variable Items	**Mean**	**STD**	**Variable Items**	**Mean**	**Gap diff**
Bank employees are reluctant to help customer	4.25	0.501	Bank Employees are reluctant to help customer	4.13	-0.12
Bank employees are too busy to respond quickly to my demands	3.76	0.473	Bank employees are too busy to respond quickly to my demands	3.53	-0.23
Bank employees seldom provided services to customers.	4.51	0.522	Bank employees seldom provided services to customers	4.46	-0.05
Trust is compromised by bank employees	3.55	0.402	Trust is compromised by bank employees	3.42	-0.13
Bank staff are not proficient or talented in attending to my request.	3.28	0.399	Bank staff are not proficient or talented in attending to my request.	3.11	-0.17
Bank staff are courteous	4.43	0.518	Bank staff are courteous	4.24	-0.19
Average summation	**4.76**	**0.469**	**Average summation**	**4.53**	**-0.89**

The Assurance aspect which depicts the level of familiarity and politeness of bank employees and their ability to inspire confidence are presented Table 5. A mean expectation score of 3.57 and perception score of 3.44 were recorded for the item 'there is security in transactions with the bank staff (no anxiety about fraudulent activities). The other three service items have a similar mean score. The service item 'I have confidence in the use of online bank transactions' ranked second from all other service items with mean score of 3.55 and standard deviation of 0.401. However, the Gap difference (P-E) of all the items investigated depicts a high level of dissatisfaction as *per* expectation amongst smallholder farmers who patronise commercial banks in the area.

Table 5: Smallholder farmers' satisfaction Aspect: Assurance concept

Assurance Expectation			**Assurance Perception**		
Variable Items	**Mean**	**STD**	**Variable Items**	**Mean**	**Gap diff**
There is security in transactions with the bank staff (no anxiety about fraudulent activities, etc.).	3.57	0.402	There is security in transactions with the bank staff (no anxiety about fraudulent activities, etc.).	3.44	-0.13
I feel safe in the use of ATMs of bank	3.49	0.381	I feel safe in the use of ATMs of bank	3.25	-0.24
I have confidence in the use of online bank transactions	3.55	0.401	I have confidence in the use of online bank transactions	3.35	-0.20
Average summation	**3.54**	**0.395**	**Average summation**	**3.35**	**-0.57**

The Empathy expectation and Perception of smallholder farmers are represented in Table 6. The variable service item 'My personal interest is not sincerely taken into consideration by the bank' recorded the highest mean score of 5.63 with Gap difference of -0.33. Another service item with 5.01 mean score was the ATM services provision with a Gap difference of -0.20. The average summation recorded from the investigation was 5.05 for the expectation score and 4.86 for the perception score. The closer the perception score to expectation score, the higher the perceived level of quality service. Findings of the study reveals however, that the overall assessment of smallholder farmers' expectation exceeds the perceived service that was given by selected commercial banks. According to Kotler and Keller (2006), when perceived services rendered to customers falls short of expected service, the customer loses interest in the service provider.

Table 7: Smallholder farmers' satisfaction Aspect: Empathy concept

Empathy Expectation			**Empathy Perception**		
Items	**Mean**	**STD**	**Items**	**Mean**	**Gap diff**
No personal attention from banks	5.24	0.76	No personal attention from banks	5.13	-0.11
My personal interest is not sincerely taken into consideration by the bank	5.63	0.662	My personal interest is not sincerely taken into consideration by the bank	5.45	-0.22
No convenient operating hours offered to customers	4.89	0.58	No convenient operating hours offered to customers	4.67	-0.22
ATM services provided are in consonant with customers' needs.	5.01	0.642	ATM services provided are in consonant with customers' needs.	4.89	-0.20
Bank transactions online are intended to serve the interests of customers.	4.78	0.499	Bank transactions online are intended to serve the interests of customers	4.45	-0.33
Bank monthly or periodic statements are not explicit to comprehend	4.55	0.475	Bank monthly or periodic statements are not explicit to comprehend	4.23	-0.32
Average summation	**5.05**	**0.603**	**Average summation**	**4.86**	**-1.40**

Table 7 illustrate the relationship between the adopted five SERVQUAL variables by applying the correlation analysis to establish the degree of relationship with smallholder farmers' satisfaction. The T-test was also employed for comparison of the variables. The *p-value* = 0.008 for the variable tangibility and reliability indicate that there is a significant relationship that exist between the two items and satisfaction of smallholder farmers. This implies that any addition or increases in Tangibility and Reliability items will positively increase smallholders' farmers' satisfaction. The variable Empathy with a *p-value* = 0.006 also depicts that any additional Empathy input added to services rendered by commercial banks, will positively increase satisfaction**.**

Table 7: Regression analysis showing relationship between the 5 SERVQUAL dimensions and smallholder farmers satisfaction.

Dimensions	Unstandardized Coefficients		Standardised Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	**8.077**	**.505**		**16.003**	**.000**
TANGIBILITY	-.030	.079	-.030	-3.375	.008
RELIABILITY	.197	.074	.208	2.665	.008
RESPONSIVENESS	.044	.090	.038	.485	.028
ASSURANCE	-.124	.067	-.137	-1.847	.067
EMPATHY	-.341	.121	-.239	-2.809	.006

5. CONCLUSION

The study investigated the outcome of smallholders' farmers' Expectation and Perception of service quality and satisfaction in commercial banking in Amathole Local Municipality Eastern Cape, South Africa. The paper measured the clients' reliability expectation of service quality, the item 'promises are fulfilled by banks to deliver services at an agreed time' recorded a mean score of 4.52 for Expectation and 3.21 for Perception; with a negative gap difference (Perception – Expectation) of -0.34. However, overall average score was 3.55 for reliability expectation and 3.40 for reliability perception with a negative gap difference (P-E) of -0.81. The implication here is that, banks requires improvement to meet the expectations of smallholder farmers. This finding lead credence to the theory of Parasuraman *et al.* (1988) which postulates that there is need for firms to make effort towards improvement when clients expectation exceeds the perceived services rendered. In general, continuous training and refreshers programmes to improve competencies in service delivery for bank customers becomes imperative.

The results from Expectation and Perception has a Gap difference of -1.16 which emphasised that smallholder farmers placed high premium on latest equipment and facilities for expected services. This phenomenon could be attributed to the fact that respondents have higher expectations on tangibles items primarily because of awareness and increasing levels of technology.

The responsiveness aspect which is the 'readiness to assist customers in various dimensions' recorded a mean expectation score of 4.25 and mean perception score of 4.13 with Gap difference (P-E) of -0.12. The overall average for Responsiveness aspect indicates that service quality levels fails to meet the expectations of smallholder farmers.
The assurance aspect which depicts the level of familiarity and politeness of bank employees and their ability to inspire confidence also depicts a high level of dissatisfaction as *per* expectation amongst smallholder farmers who patronise commercial banks in the area.

Findings further reveals that the closer the perception score to expectation score, the higher the perceived level of quality service. However, the overall assessment of smallholder farmers' expectation exceeds the perceived service that was given by selected commercial banks. According to Kotler and Keller (2006), when perceived services rendered to customers falls short of expected service, the customer loses interest in the service provider.

Furthermore, in determining relationship between the adopted five SERVQUAL variables using the correlation analysis, reveals that there is significant relationship between the two items: Tangibility and Reliability, and smallholder farmers' satisfaction (*p-value* = 0.008). This implies that any

increase in Tangibility and Reliability items will positively increase smallholders' farmers' satisfaction. The quality of services requires a rational approach and training of bank staff to enhance improvement that will contribute to encouraging smallholder farmers to stay loyal and avoid switching banks.

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Back to Table of Contents

SPECIES COMPOSITION AND BIOMASS PRODUCTION IN TWO COMMUNAL COASTAL RANGELANDS OF THE EASTERN CAPE PROVINCE, SOUTH AFRICA.

Matshawule, S.[65]

ABSTRACT

This study investigated species composition and biomass production of herbaceous plants in two communal rangelands surrounding homesteads areas. In each study area, the rangelands were divided based on the distance from homesteads into near (up to 1 km), middle (> 1–2 km) and far (> 2–3 km) sites. On each site a HVU of 50 m x 20 m was used and six 0.25 m^2 quadrants were laid randomly on each HVU. Herbaceous species found within a quadrant were identified, counted and their height and tuft were measured. Herbaceous species were also harvested, bulked and placed into well labelled brown paper bags and oven-dried for 48 hours at 60 ^oC to determine biomass production. Herbaceous species were also classified according to their palatability ecological status and life form. Data were collected for two seasons over 2014/15 (winter and summer). A total of 20 herbaceous species were identified in the study areas. Of these 17 were grass species. The most common or dominant grass species were T. triandra, C. dactylon, E. capensis, E. plana and S. africanus. At Dyamdyam T. triandra showed the greatest frequency of occurrence at far site than middle and near homesteads sites. The frequency occurrence of S. africanus at Machibi was relatively similar in all the study sites. Density of herbaceous species was significantly lowest on near and bottom sites at Dyamdyam and Machibi, respectively. In both winter and summer, grazing site far and top from homestead had greatest (P <0.05) biomass production at Dyamdyam and Machibi respectively. The biomass production was significantly highest in the summer than the winter across the study sites in both study areas. It can be concluded that composition of herbaceous species and biomass production are significantly dependent on distance and topography from homesteads and seasons. Therefore, any rangeland management practices in communal grazing lands should consider these factors in to consideration during the planning of development progress.

Keywords: Distance gradient, livestock, topography, summer, soil, vegetation, winter

1. INTRODUCTION

1.1 Introduction

Communal rangelands are used mainly as sources of forage for livestock and collection of wood for fire and building (Everson & Hatch, 1999). These rangelands have different species composition and biomass productions (Oztas *et al.*, 2003). Species composition and biomass production on communal rangeland vary according to grazing system (Shackleton, 1993), seasonal variation (Angasa & Oba, 2010), soil type (O' Farrell *et al*., 2007), topography (Lesoli, 2008) and grazing intensity (Smet & Ward, 2003; Maki *et al*., 2007).

Species composition is defined as the relative frequency of occurrence of heterogeneous herbaceous species in a rangeland (Trollope *et al.*, 1990). In addition, it is one of the factors that indicate the rangeland condition because herbaceous species differ significantly in their acceptability, ecological status, life form and response to grazing (Abule *et al*., 2007). It has been reported that, high grazing pressure on natural rangelands causes changes in species composition (Maki *et al*., 2007). Decreaser

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species disappear in response to heavy grazing and are replaced by increaser and invader species that are less palatable and adapted to withstand over utilization (Sisay & Baars, 2002). Most rangelands in communal areas of South Africa are continuously grazed due to the absence of fence and this affects distribution of herbaceous species (Shackleton, 1993). In addition, high grazing intensity can alter vegetation from being dominated by perennial species to being dominated by annual species due to the high stocking rate on grazing lands (Smet & Ward, 2003). Other researchersat species composition change is determined more by rainfall rather than by grazing pressure. In summer there is more rainfall that promotes height, diameter and basal cover of grass species.

Biomass production is a total dry matter of living material which is actively and structurally functional in a given area and is normally used as source of energy for livestock and for fuel (Bond-Lamberty *et al.*, 2002). According to Angasa & Oba (2010), biomass production during the dry season is lower than during the wet season. This is allied with high amount of rainfall and availability of moisture during wet season than dry season (Angasa & Oba, 2010). The part of rangelands that is heavily grazed for long period of time has lower biomass production (Shackleton, 1993). In addition, biomass production in silt and clay soil is higher than in sandy soil due to the high organic matter and minerals in clay and silt soils than sandy soils (O' Farrell *et al*., 2007).

Landscape positions have significant effects on the biomass production with several reports showing bottomlands having higher biomass production than slope and top lands (Coronato & Bertiller, 1996; Lesoli, 2008). In contrast, other researchers reported bottomlands have lower biomass due to the presence of heavy grazing pressure because of easily access by livestock than the plants found on top lands (Senft *et al.*, 1985; Belsky & Blumenthal, 1997; Lesoli, 2008). Studies that are conducted on communal coastal rangelands of South Africa to investigate the change in species composition and biomass production along the gradient distance from homestead are limited. There is also no information regarding the seasonal variations in the above variables along distance gradient from homesteads. The availability of such information would contribute towards of planning management and rehabilitation programs in the communal rangelands to improve fodder production for livestock. Therefore, the objectives of this study were 1) to assess herbaceous species distribution and biomass production along distance gradient from homesteads in two communal rangelands, 2) to investigate the effects of season on biomass production and species distribution.

1.2 Methods and Materials

1.3 Selection of study sites and layout

Two long transect radiating away from the homesteads in each communal area was established and divided into three main grazing sites. The transects were established in the directions of the main grazing activities. Dyamdyam is situated on relatively plain land and; hence the rangeland was simply divided according to the distance from homesteads into near (up to 1 km), middle (> 1–2 km) and far (> 2–3 km) sites. Machibi is set on a gentle steep slope, and therefore three grazing sites were identified to represent the bottom (near), slope (middle) and top (far) sites from homestead. On each study site a HVU of 20 m x 50 m was marked to record vegetation data from six 0.25 m^2 quadrants that were laid randomly.

1.4 Data collection

Data on herbaceous species composition, tuft diameter, height, density and biomass were collected from two different directions where the livestock are grazing in each study area. In each 0.25 m^2 quadrants herbaceous species found within a quadrant were identified, counted and recorded. Height

and tuft diameter of herbaceous species were measured using 30 cm ruler and recorded. Total density was obtained by adding all the herbaceous species found in each site. Density for each herbaceous species found in study areas were then calculated as the percentage to obtain the frequency of occurrence of each herbaceous species. Herbaceous species found within a quadrant were harvested, bulked and placed into well label brown paper bags. Harvested herbaceous samples were then oven-dried for 24 hours at 60 ^{o}C. Dried grass samples were weighed to determine dry matter (DM) production. Data was collected in winter and summer in 2014 and 2015.

1.5 Species classification

Classification of herbaceous species was based on the succession theory described by Dyksterhuis (1994) and on the ecological information for the arid to semi-arid region of South Africa (Vorster, 1982). Herbaceous species were classified according to their ecological status and response to grazing such as: (i) highly palatable: those species occur in rangeland that is in good condition and decrease with heavy grazing (decreaser species); (ii) palatable species: those species occur in rangeland in good and increase with moderate overgrazing (increaser IIa); (iii) less palatable species: those species which occur in rangeland in good condition and increase with high overgrazing (increaser IIb and IIc) and (iv) poorly palatable: those species which occur in rangeland in poor condition and increase with extreme overgrazing (invaders).

Herbaceous species were also grouped according to their life form as annual and perennial (Van Oudtshoon, 1992). Grasses were further identified to species level, while other herbaceous plants belonging to other families were categorised as forbs, sedges and Karoo species.

1.6 Statistical analyses

Data on biomass and species composition were analysed using General Linear Model (GLM) procedure of SAS (2010). Mean separation was done using PDIFF option of SAS (2010). Data analyses for two study areas were done separately because they had different landscape, geology, altitude and vegetation types. Descriptive statistics such as percentage and means were used where applicable. Species composition, biomass, density and height of herbaceous species show significant interaction between site and seasons in both study areas.

2. RESULTS

2.1 Ecological status, life form, palatability and frequency of occurrence of herbaceous species.

A total of 20 herbaceous species were identified in the study areas. Three of the identified herbaceous species were categorized as forb, sedge, and Karroo species whereas 17 were grasses. In terms of their life form, all the identified herbaceous species were perennial (Table 4.1). In terms of their palatability, 6 herbaceous species were highly palatable, 1 was moderately palatable and 13 were low palatable. According to their ecological index, 4 grass species were classified as Decreaser species, 4 Increaser I, 9 Increaser II, 2 Increaser III and 1 invader species (Table 4.1). Of the total grass species identified, 5 grass species were classified as most common or dominant grass species over the study sites (Table 1). These include *T. triandra, C. dactylon, E. capensis, E. plana* and *S. africanus.* One of the common or dominant species was highly desired by livestock (*T. triandra*).

Table 1: Ecological status, life form, palatability and frequency occurrence of herbaceous species identified in the study areas.

				Dyamdyam				**Machibi**		
Grass species	ES	LF	Pa	Near	Middle	Far		Bottom	Slope	Top
Themeda triandra	De	P	HP	LC	LC	C		C	D	D
Cynodon dactylon	Inc II	P	HP	LC	D	C		C	LC	C
Eragrostis plana	Inc II	P	LP	LC	C	C		LC	LC	D
Sporobolus africanus	IncII	P	LP	LC	C	D		C	C	C
Tristachya leacothrix	Inc I	P	LP	LC	LC	LC				
Elulia vilosa	Inc I	P	LP	R	LC	LC				
Hyperrhenia hirta	IncI	P	LP	R	+	+				
Digitaria eriantha	De	P	HP					R	R	D
Paspalum dilatatum	Inv	P	LP	LC	R	R		R	R	R
Setaria megaphylla	De	P	HP	LC	R	R		R	R	LC
Brachiaria serrate	De	P	HP	LC	R	R		R	R	R
Cymbopogon excavatus	IncI	P	LP	LC	R	R		R	R	R
Sedges	IncIII	P	LP	R	R	R				
Forbs	IncII	P	LP	R	LC	R		R	R	LC
Karroo	IncII	P	LP	R	R	R		LC	R	R

ES= ecological status, LF= life form, Pa= palatability, De= decreaser, IncI= increaser I, IncII= increaser II, Inc III= increaser III, Inv= invader, P= perennial, HP= high palatable, MP= moderate palatable, LP= low palatable, D= dominant (>15 %), C= common (10 %-15 %), LC= less common (5 %-10 %), R= rear (1 %-5 %) + = present (<1 %) and – = absence

2.2 Common or dominant species

Common or dominant grass species in this study are defined as those species recorded along the distance gradient from homesteads in each study area and had >15 % (dominant) and >10 %– 15 % (common) frequency occurrence at least in one of the study sites. Results for frequency of occurrence of common or dominant grass species identified at Dyamdyam rangeland are presented in Figure 1. At Dyamdyam frequency occurrence of *T. triandra* was significantly higher on far site than middle and near sites. Along the distance gradient from homestead *C. dactylon* had the greatest occurrence on middle site followed by the far and near sites. The frequency occurrence *E. plana* was relatively similar on middle and far sites however were higher than near site. The proportion occurrence of *S. africanus* was significantly higher on far site followed by the middle and near sites.

Results for frequency occurrence of common or dominant grass species identified at Machibi rangeland are presented in Figure 2. At Machibi the frequency occurrence of *T. triandra* was

significantly highest on slope site followed by the top and bottom sites. Along the landscape from homestead *E. plana* had greatest proportion occurrence on top site than slope and bottom sites. On bottom and top sites, the frequency occurrence of *C. dactylon* was greatest and lowest on slope site. Frequency occurrence of *S. africanus* has similar values on slope and top sites but was higher than bottom site.

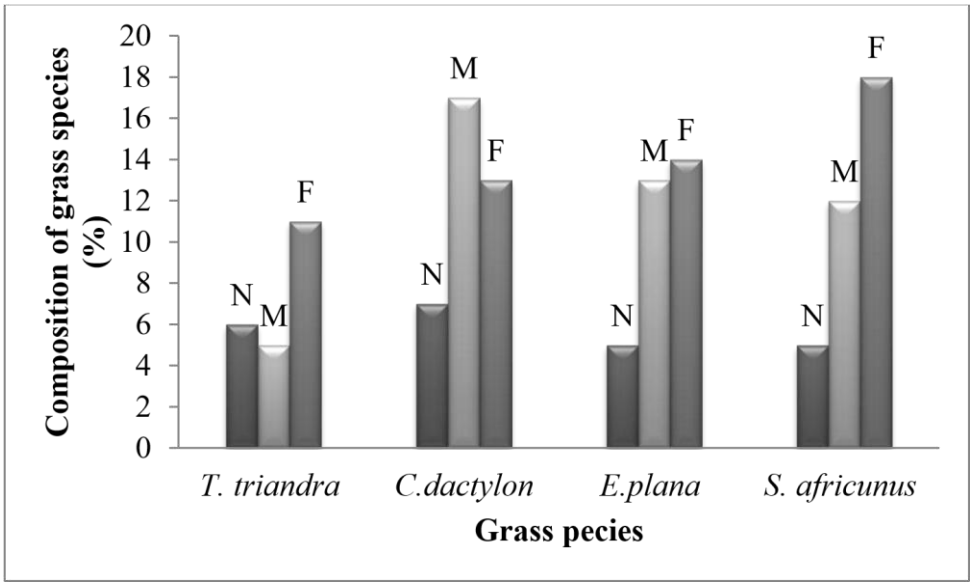

Figure: 1: Species composition (%) of common or dominant grasses based on frequency of occurrence at Dyamdyam. N= near, M= middle and F= far

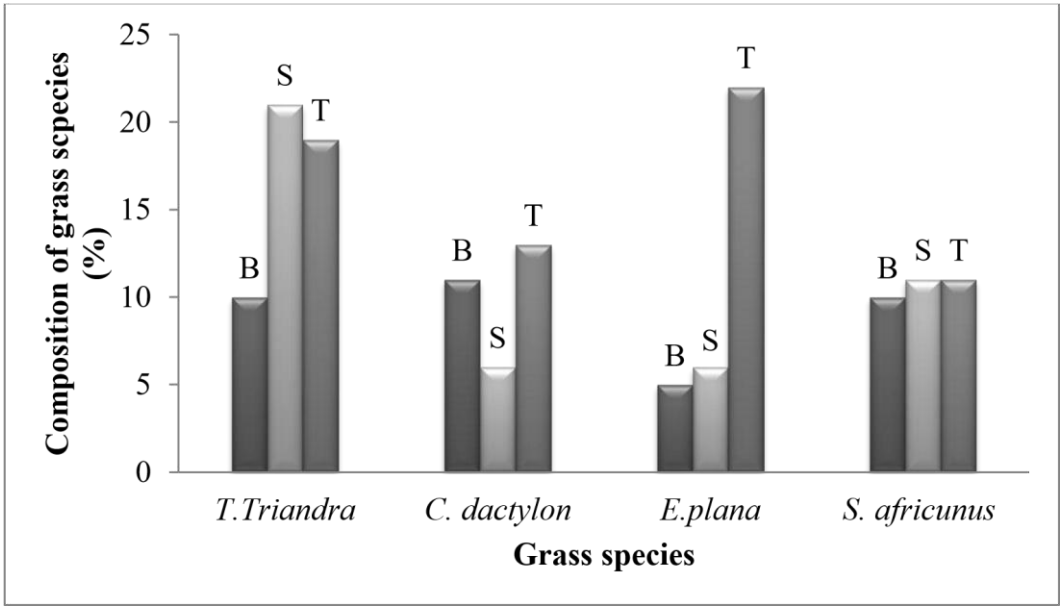

Figure: 2: Species composition (%) of common or dominant grasses based on frequency of occurrence at Machibi. B= bottom, S= slope and T= top

2.3 Biomass production of herbaceous species

In winter, far grazing site from homesteads at Dyamdyam had the greatest ($P < 0.05$) biomass production followed by middle and near sites. In summer, far and middle grazing sites had higher

biomass production than near site (Table 2). In winter, top grazing site at Machibi had highest (P <0.05) biomass production followed by midslope and bottom sites. In summer, top and midslope grazing sites had higher biomass production than bottom site. Biomass production in all the study sites was significantly different between winter and summer season except for far and top sites at Dyamdyam and Machibi respectively (Table 2).

Table 2: Mean biomass production (kg ha^{-1}) of herbaceous species harvested from study areas.

Areas/Sites	Biomass	Biomass
Dyamdyam	Winter	Summer
Near	715.5^{Cb}	1015.0^{Ba}
Middle	1042.1^{Bb}	1127.5^{Aa}
Far	1106.3^{Aa}	1113.0^{Aa}
SE	67.5	67.5
Machibi		
Bottom	405.9^{Cb}	669.6^{Ba}
Slope	780.4^{Bb}	857.8^{Aa}
Top	809.1^{Aa}	840.4^{Aa}
SE	79.6	79.6

Lowercase superscripts are used to compare means between seasons within each site. ^{ABC}Uppercase superscripts are used to compare site averages within each season. Means with different superscript within the columns and rows are significantly different (P < 0.05).

2.4 Height and tuft diameter of common or dominant species

The results for plant height and tuft diameter of common or dominant grass species are presented in Table 3 and 4 respectively. The plant height and tuft diameter were significantly different across the study sites in some common or dominant grass species, while in other species they were not significantly different between the study sites. *Themeda triandra* at Dyamdyam had the highest (P <0.05) height in middle site followed by the far and near sites. Highest plant height for *C. dactylon* and *E. plana* at Dyamdyam was recorded in far site. Plant height of *S. africunus* was highest (P <0.05) in middle site followed by the near and far sites.

At Machibi plant height of *T. triandra* was highest (P <0.05) in the slope and top sites than the bottom site. Plant height of *E. plana* was significantly highest in slope site followed by bottom and top sites. Plant height of *S. africanus* was significantly highest in top site followed by slope and bottom sites. Plant height of *C dactylon* was highest (P <0.05) on samples collected from top site followed by bottom and slope sites.

Table 3: Mean height (cm) of common grass species found in study areas

		Dyamdy am			Machibi			
Grass species	Near	Middle	Far	SE	Bottom	Slope	Top	SE
T. triandra	11^{c}	18^{a}	12^{b}	2.3	9.0^{b}	11^{a}	11^{a}	2.0
C. dactylon	13^{c}	15^{b}	17^{a}	2.3	12^{b}	9.3^{c}	14^{a}	4.0
E. plana	14^{c}	15^{b}	20^{a}	2.3	11^{b}	13^{a}	9.0^{c}	2.1
S. africanus	13^{b}	20^{a}	11^{c}	2.3	9.0^{b}	9.2^{b}	11^{a}	1.9

^{abc}Different superscripts for each species in a row denote significant differences at $p < 0.05$ between different distances and landscape. SE= Standard Error

At Dyamdyam tufts diameters of *T. triandra* and *E. plana* were not significantly different (P> 0.05) between the sites. Tuft diameter of *C. dactlyon* was slightly highest on near site than middle and far sites. For *S. africunas* tuft diameter was not significant different (P> 0.05) across the study sites. At Machibi tuft diameter of *T. triandra* and *C. dactylon* were not significantly differ (P> 0.05) between slope and top sites however it was slightly highest on bottom sites. For *S. africunus* tuft diameter was not significantly different (P > 0.05) between bottom and slope sites. Tufts diameter of *E. plana* was not significantly different (P > 0.05) between all the study sites.

Table 4: Mean tufts diameter (cm) of common grass species found in study areas

	Dyamdyam					Machibi			
Grass species	Near	Middle	Far	SE		Bottom	Slope	Top	SE
T. triandra	2.1^{a}	2.3^{a}	2.0^{a}	0.3		3.0^{a}	2.0^{b}	2.4^{b}	0.4
C. dactylon	3.0^{a}	2.3^{b}	2.4^{b}	0.4		3.4^{a}	2.1^{b}	2.0^{b}	0.7
E. plana	3.0^{a}	3.4^{a}	3.0^{a}	0.3		2.0^{a}	2.0^{a}	2.2^{a}	0.3
S. africanus	3.1^{a}	4.0^{a}	3.0^{a}	0.7		2.2^{a}	1.2^{b}	2.0^{a}	0.5

^{abc}Different superscripts for each species in a row denote significant differences at $p < 0.05$ between different distances and landscape. SE= Standard Error

2.5 Total density of herbaceous species

The results for total mean density of herbaceous species identified in study areas are presented in (Table 5). Both in summer and winter at Dyamdyam total mean density was highest (P <0.05) in far site followed by middle and near. Similarly, at Machibi the total density of herbaceous species was significantly highest in top site followed by slope and bottom in winter and summer. Total density of herbaceous species was highest (P <0.05) in summer than winter across the study sites in both study areas.

Table 5: Mean density (m^{-2}) of herbaceous species identified in two study areas.

Areas/Sites	**Total Density**	**Total Density**
Dyamdyam	Winter	Summer
Near	30^{Cb}	43^{Ca}
Middle	51^{Bb}	63^{Ba}
Far	67^{Ab}	74^{Aa}
SE	1.9	1.9
Machibi		
Bottom	33^{Cb}	50^{Ca}
Slope	57^{Bb}	65^{Ba}
Top	66^{Ab}	72^{Aa}
SE	2.2	2.2

^{abc}Lowercase superscripts are used to compare means between seasons within each site. ^{ABC}Uppercase superscripts are used to compare site averages within each season. Means with different superscript within the columns and rows are significantly different ($P < 0.05$).

3 DISCUSSION

3.1. Ecological status, life form and palatability of herbaceous species

In the present study herbaceous species in the study areas were dominated more by increaser and less palatable species. Many studies conducted elsewhere in Africa reported similar findings (Danckwerts, 2001; Sisay & Baars, 2002; Hayes & Holl, 2003; Hein, 2006; Gemedo-Dalle *et al*., 2006; Morris & Kotze, 2006; Anderson & Hoffman, 2006; Solomon *et al.*, 2007). These findings could be an indication that communal rangelands are overgrazed (Shackleton, 1993) because palatable and decreaser species decline in numbers when the rangeland is over or selectively grazed and replaced by increaser and less palatable species (Sisay & Baars, 2002). The present study also showed that study sites were dominated by perennial species. Similar results were reported by Morris & Kotze (2006). Ruminants can alter vegetation from being dominated by annual species to being dominated by perennials species due to the high stocking rate on communal grazing lands (Smet & Ward, 2003).

3.2. Composition of common or dominant grass species

Common or dominant grass species identified in the present study were similar to species recorded in the previous study conducted in the Eastern Cape Province of South Africa (Lesoli, 2008), however, they were different in their frequency of occurrence. As observed in the results of this study, it is clear that the proportion of occurrence of highly palatable species (*T. triandra*) is relatively low on near and bottom sites at Dyamdyam and Machibi, respectively. These findings suggested that these sites were selectively grazed or overgrazed. This is because palatable grass species are very much

under pressure from selective grazing and over utilization and are the first species that are removed under heavily grazed rangelands. This view is supported by Quattrocchi (2006) who reported that, *T. triandra* is an indicator of a good rangeland condition and it quickly disappears in part of rangeland where overgrazing and selective grazing occurs. In addition, *T. triandra* is growing well and most commonly occurs in undisturbed open grasslands with an optimum amount of rainfall. *Cynodon dactylon* was found to be slightly higher on bottom and near sites than other sites. This indicates that bottom and near sites were heavily grazed because *C. dactylon* is the dominant key species in rangeland that is heavily grazed (Van Oudtshoorn, 1992). In addition, *C. dactylon* is the perennial grass that grows well in all types of soil, more especial in sandy soil and disturbed areas (Xu *et al.*, 2011). Frequency of occurrence of *E. plana* and *S. africanus* were relatively low on near and bottom sites compared to other grazing sites. However, these species were expected to be high on these sites because they grow well in disturbed soil such as trampled part of rangeland by livestock as well as near the homestead, roads and drinking areas (Van Oudtshoon, 2012).

3.3. Biomass production

The current study showed that mean biomass production in all the study sites was higher in summer than in winter. High biomass production in summer could partly be explained by high rainfall and optimum temperature that promote tropical and subtropical vegetation growth. These results concur with the reports of Noellemeyer *et al.* (2006) in semi-arid areas of Argentina and as above Angasa & Oba (2010) in southern Ethiopia, who observed seasonal variation in biomass production. This was however not in agreement with the study of McDonald *et al.* (1987) who did not find any seasonal variation in biomass production.

Biomass production at Dyamdyam was low on near site from homesteads than the other sites. The present results correspond with earlier findings by Savadogo *et al.* (2007) in the savanna woodlands of Burkina Faso. This can be explained by the fact that near site was heavily grazed due to easy access by ruminants and availability of the drinking areas. Energy requirement of ruminants is different depending on the distance which livestock walk. Therefore, this might lead to declined movement of livestock which in turn would result in high density of livestock on easily accessible grazing sites (Bailey *et al.*, 1996).

In the current study biomass production at Machibi was higher on top and slope sites than bottom sites. Similar results were reported by Senft *et al*. (1985) and Lesoli (2008) in communal grazing lands of South Africa. This indicates that livestock spend most of the time grazing in bottom lands due to easy access. For grazing sites found on heterogeneous landscape, animal grazing distribution pattern might be impacted by variations in landscape (Lesoli, 2008). However, the bottom site in the present study was expected to have high biomass production than slope and top positions due to the high accumulation of nutrients on bottomlands (Coronato & Bertiller, 1996) because nutrients promote plant activities.

3.4. Height and diameter of common or dominant grasses

In the current study all common or dominant grass species, except *S. africanus* at Dyamdyam, had the highest mean height in the middle and far sites rather than the near site. As discussed previously near site had been grazed more intensively than other sites. Therefore, this may cause a short grass height on this site due to high grazing pressure. At Machibi all the common or dominant grass species, except *C. dactylon*, had the highest height on top and slope sites than the bottom site. This is associated with physical damage caused by ruminants. *Cynodon dactylon* had highest height on

bottomland than slope. This confirms the fact that *C. dactylon* grow well in overgrazed and disturbed areas (Van Oudtshoorn, 1992) and is common in sandy soil (Xu *et al.*, 2011).

Plant height of *S. africanus, T. triandra* and *E. plana* across the study sites and in both study areas was below the maximum growth range of 28–150 cm, 30–150 cm and 40–100 cm respectively suggested by Van Outshoorn (2012). Plant height of *C. dactylon* across the study and in both study areas was within the maximum growth range of 5–40 cm reported by Van Outshoorn (2012).

This study showed that average tuft diameters of *T. triandra* and *E. plana* at Dyamdyam were not significantly different amongst all the sites. This indicates that a tuft diameter of these species in the present study did not influenced by distance from homestead. However, the difference was expected due to differences in grazing intensity and accumulation of nutrients along the distance gradient from homesteads.

In the current study average tufts diameter of *T. triandra* and *C. dactylon* at Machibi did not show the significant difference between slope and top sites. These results contradict with the report of O' Connor & Pickett (1999) in the semi-arid savannas of East Africa who reported that, there is steady change in grass species along grazing gradients usually characterized by a decline in tuft size. Tufts diameter of *T. triandra* and *C. dactylon* was bigger in bottom site than slope and top sites. This can be attributed to the high accumulation of soil nutrients in the bottomlands (Coronato & Bertiller, 1996) because nutrients promote plant activities. Plant tuft size of *C. dactylon, S. africanus, T. triandra* and *E. plana* across the study sites and in both study areas was below the maximum tuft diameter range of 5–10 cm, 10–14 cm, 5–15 cm and 5–10 cm respectively reported by (Van Outshoorn, 2012).

3.5 Density of herbaceous species

The total mean density of herbaceous species in all the study sites and in both study areas was significantly higher in summer than in winter. Similar results were reported by Bailey *et al.* (1996). This can be attributed by a higher amount of rainfall in summer and the availability of soil nutrients. This is because plant density increases with an increase in rainfall and soil nutrients availability (Ahmad *et al.*, 2007). In the current study, total mean density of herbaceous species strongly influenced by the distance gradient from homesteads. Dyamdyam and Machibi plant density was low on near and bottom sites respectively than other sites in both seasons. Similar results were reported by Senft *et al*. (1985) and Lesoli (2008) in South Africa. High grazing intensity and human activities on bottom and near sites can result in bare patches and veld degradation which in turn results in low density of herbaceous species (Senft *et al*., 1985; Lesoli, 2008). Lower plants density on the near and bottom site could also be partially explained by the fact that small stock such as sheep and goats kraaled during night and released in the morning. This could have an effect on plant density during the livestock movement (Lesoli, 2008).

4. CONCLUSION

The present study showed that most palatable species such as *T. triandra* had low frequency occurrence in near grazing sites than middle and far sites. The study sites were dominated by *T. triandra, C. dactylon, E. capensis, E. plana* and *S. africanus*. The biomass production was significantly higher in summer than in winter season. Density of herbaceous species was low on near grazing site than middle and far. Therefore, it can be concluded that season landscape and distance from homesteads are the most important factors that affect vegetation change and the composition of herbaceous species. Therefore, any veld condition assessment and rangeland management practices

in communal rangelands should take into consideration often these factors. In addition, application of suitable grazing systems in communal grazing areas is recommended to inhibit the declining trend of highly palatable species and biomass production near the homestead to improve fodder production for ruminants.

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Back to Table of Contents

CHALLENGES OF RURAL WOMEN PARTICIPATION IN CASSAVA VALUE-CHAIN AND ITS COMMERCIALIZATION IN RIVERS STATE.

Abali, I.[66]

ABSTRACT

The study x-rayed the challenges of rural women involvement in cassava value chain and its commercialization in Rivers State, Nigeria. The specific objectives included to; examine the demographic information of the respondents; determine the level of involvement of the rural women in cassava value addition and its commercialization in the study area; and also identify the inhibiting factors to effective participation of rural women in cassava value addition and its commercialization. The study adopted review of secondary materials, interview with key stakeholders through surveys and focused group discussions to collect qualitative data from the key stakeholders. The research survey was carried out using multi-stage sampling method. Data were analysed using descriptive statistics and inferential statistics such as percentages, mean and ANOVA. The study revealed that 60 per cent of the rural women had no formal education. The study further revealed that the rural women participated at a low level in the activities related to value addition in cassava and its commercialization. There was no significant difference among the participating rural women from the various communities in cassava value chain and it commercialization i.e. f-cal. of 0.03 was less than f-tab of 2.25 at 5% alpha level. Cultural barriers on land ownership to women (3.80), Social problems such as kidnapping and arm robbery etc. (3.70) and inappropriate financial services (3.70) were among other factors identified as inhibiting factors to effective participation of rural women in value addition of cassava and its commercialization in the study area. The study concluded that the rural women involvement in cassava value addition and its commercialization were low due to some cultural practices that ban women from land ownership; social vices; access to credit facilities and some other factors indicated in the study. The extension implication of this study is for government to create an enabling environment through policy dialogue on gender mainstreaming in the area of land ownership, sustainable peace and access to credit facilities to engender effective participation of rural women in cassava value chain and its commercialization. These will increase per capita food production and raise rural women incomes who are active participants in cassava production in the study area.

Key words: Challenges, Cassava, Value Chain, Commercialization, Rural women

1. INTRODUCTION

Cassava (*Manihot spp*.) has been identified alongside yams, rice, maize, sorghum, and millet as the main food crops in Nigeria. It is a perennial root crop that grows in non-ideal conditions and represents a major staple food crop in Africa, South America and Asia and was introduced in Nigeria by returnee slaves from America. Cassava is one of the most important crops for Nigerian farmers; it is the most widely cultivated crop and provides food and income to over 30 million farmers and large numbers of processors and traders. Common cassava products in Nigeria include *garri*, *akpu*, tapioca, starch, chips and flour. G*arri* is the most (it accounts for over 70%) common cassava product. Cassava is grown in almost all the States and thrives in all agro-ecological zones in Nigeria. Its production is characterized by small scale producers especially the rural women who use old varieties and traditional production technologies which largely accounts for low yield. Oyebanji &

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Akwashiki (2003) noted that these small-holders account for over 80 per cent of cassava production in Nigeria. Over 90% of cassava produced in the country is consumed locally with less than 10% utilized for industrial purposes. The concept of value addition is a vital component of the overall strategy for addressing global market competition, post-harvest losses and food security. The processing of agro raw materials such as cassava tubers into various innovative products promote market acceptability and gives the products high economic value which consequently brings higher income to the producer (Onwualu, 2012; Abali, 2015). The Value Chain concept acknowledges that production must be linked to demand and the critical role of organizing the flow from farmer to consumer opportunities.

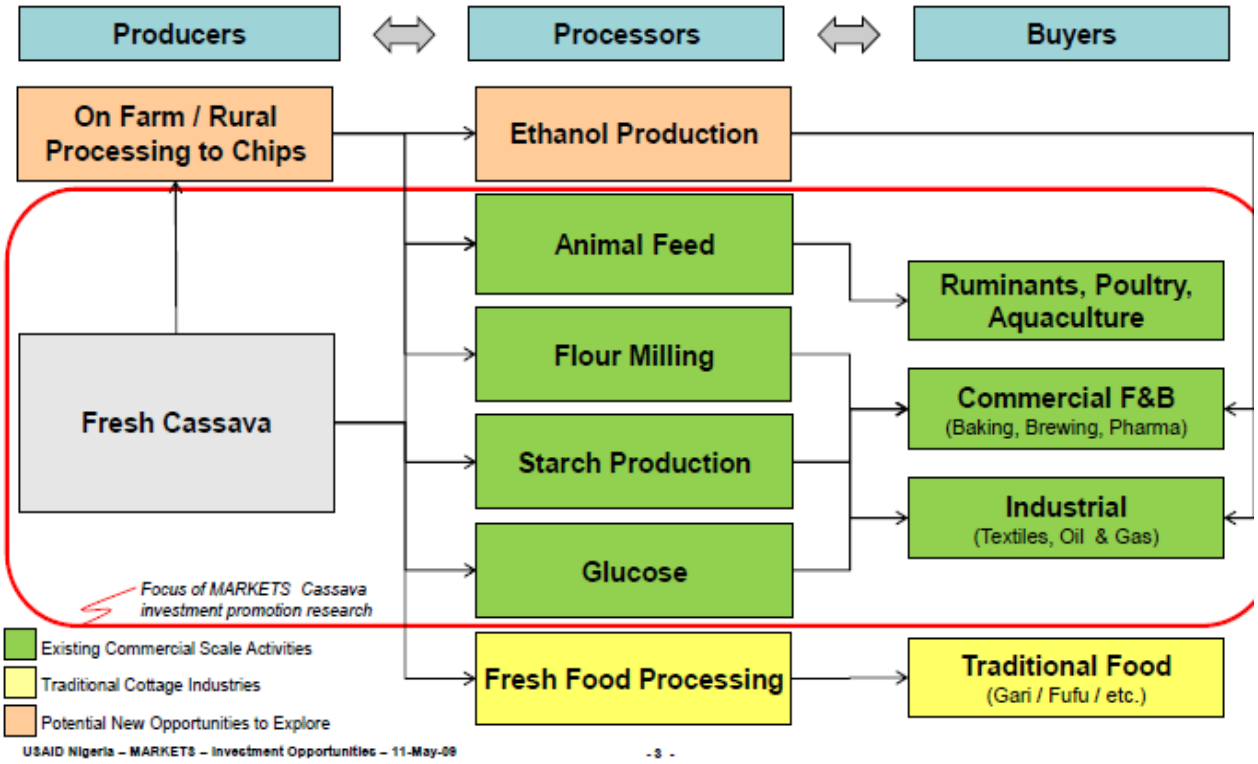

Figure. 1: Cassava value chain model
Source: Onwualu (2012).

According to Ogbonnaya & Ifeanyi, (2014) quoting Imminic & Alarcon, (1993) and Strasberg *et al.*, (1999) who stated that a farm business is assumed to be commercialized if it is producing a significant amount of cash commodities, allocating a proportion of its marketable commodities, or selling a considerable proportion of its agricultural outputs. For the purpose of this study, cassava commercialization is seen as the aggregate of household surplus presented by smallholder farmers (rural cassava-based women) in the market for acquisition and income generation. Women play significant roles in cassava production, processing and marketing. In recognition of this, Abali & Ifenkwe (2015) citing Shamsodini *et al* (2011) stated that women are almost entirely responsible for virtually all activities like hoeing, weeding, harvesting, transporting, storing, processing, marketing and domestic chores which provides them with additional income-earning opportunity and enhances their ability to contribute to household food security. Rahman (2004) also observed that rural women in Nigeria form an active and reserve labour force but they rarely own the means of productions. However, the position of women in meeting challenges of agricultural development cannot be over emphasized. Women make a significant contribution to food production; they provide 60-80% of agricultural labour and are responsible for 80% of food production (Mgbada, 2002; Rahman, 2004).

Considering these roles and the low level of cassava value addition and its commercialization in the study area, it seems the rural women are not doing enough to adding more value in their farm produce especially in cassava for its commercialization? If this is true, what are the limiting factors to effective participation of rural women in cassava value addition and its commercialization? The answers to these questions formed the policy trust of this research study.

2. PURPOSE OF THE STUDY

The main purpose of this study is to examine the challenges of rural women participation in cassava value chain and its commercialisation in Rivers State, Nigeria. However, the specific objectives of the study include to; examine the socio-economic characteristics of the respondents; determine the level of involvement among the rural women in cassava value chain and its commercialisation; identify factors affecting rural women involvement in cassava value chain and its commercialisation.

3. HYPOTHESIS OF THE STUDY

Ho: There is no significant difference among rural women involvement in cassava value chain and its commercialisation

4. METHODOLOGY OF THE STUDY

The study was carried out in Rivers State, one of the thirty six (36) states located in the Niger Delta region of the Federal Republic of Nigeria. It lies approximately between latitude 4^{0N} and 6^{0N}, and longitude 6^{0E} and 7^{0E}. It covers an area of about 21,850 square kilometres. It is bounded to the South by Atlantic Ocean, to the North by the Abia, Imo, and Anambra States, to the East by Akwa Ibom State, and to the West by Bayelsa and Delta States. The inland part of the State consists of tropical rainforest vegetation, and also features many mangrove swamps. The State is divided into twenty three (23) Local Government Areas. Fourteen out of the twenty three LGAs are located on the up-land with heights varying between 13-45m above sea level. They include; Ogoni, Ikwerre, Emohua, Ahoada East, Abua/ Odua, Ogba/Egbema/Ndoni, Port Harcourt, Ahoada West Local Government Areas, among others (Abali *et al.*, 2010).

Rainfall in Rivers State is seasonal, variable and heavy. Generally, south of latitude 5^{ON} occurs on the average, every month of the year by varying duration. The state is characterized by high rainfall which decreases from South to North. It is 4698mm at Bonny along the coast and 1862 at Degema. Rainfall is adequate for all year-round crop production in the State. The mean monthly temperature is within the range of 25^{oc} and 28^{oc}.

Multi-stage sampling technique was adopted for this study. At the first stage, purposive sampling technique was used to select six (6) Local Government Areas from the twenty three Local Government Areas of Rivers State. The LGAs include Abua-odual, Ogba-Egbema-Ndoni, Emohua, Ikwerre, Ahoada West, and Ahoada East Local Government Areas. At the second stage, five communities from each of the six local government areas were randomly selected giving a total number of thirty (30) communities. The third stage involved the use of simple random sampling technique to select four (4) cassava based rural women farmers. This gave a total sample size of one hundred and twenty (120) respondents for the study. Primary and secondary data were used to elicit information necessary for the study. The primary data for the study were obtained using a structured questionnaire and responses recorded from the respondents during the focus group discussion. Data were analysed using descriptive and inferential statistics.

5. RESULTS OF THE STUDY

5.1 Demographic information

Information relating to the socio-economic characteristics of the respondents was captured in Table 1. It was revealed that 46.67 per cent of the respondents were within the age bracket of 40-49 years which recorded the highest percentage in age distribution of the respondents. This result shows that majority of the respondents were active and are willing to indulge in any rural development agenda.

Table 1: Demographic information of the respondents

Variables	Frequency	Percentage (%)
Age		
< 20yrs	4	3.33
20-29yrs	17	14.17
30-39yrs	22	18.33
40-49yrs	56	46.67
50-59yrs	15	12.50
60yrs & above	6	5.00
Marital status		
Married	90	75.00
Single	3	2.50
Separated	5	4.17
Widow/Widower	22	18.33
Educational attainment		
No formal education	72	60.00
FSLC	7	5.83
SSCE/WASC	33	27.50
OND/NCE	6	5.00
B.Sc/ B.Ed	2	1.67
Post-graduate degree	-	-
Others	-	-
Religion		
Christianity	115	95.83
Islam	-	-
Traditional	5	4.17
Occupation		
Farming	90	75.00
Farming & other related activities	30	25.00
Monthly income (₦)		
< 10,000	10	8.33
10,000-20,999	90	75.00
21,000-30,999	5	4.17
31,000-40,999	4	3.33
41,000-50,999	6	5.00
51,000-60,999	2	1.67
61,000 & above	3	2.50
Household size		
< 2	2	1.67

2-3	3	2.50
4-5	25	20.83
6-7	30	25.00
7 & above	60	50.00

Source: Field Survey, 2017

The result corroborates with the findings of Oladejo, *et al*., (2011) who also stated in their study that same age range simply means that the respondents are within the active and productive age and are ready to participate in any rural development project. Responding on marital status, it was revealed that 75% of the respondents are married. Table 4 further revealed that 60% of the respondents had no formal education. This finding corroborates with the result obtained during the focus group discussion whereby majority (60%) of the selected discussants affirmed that *they never had any form of formal education and that it deprives them from effective participation in any rural development project and other innovations in agriculture* (FGD,2017). Responding on religion, 96 per cent of the respondents stated that they are Christians while 4 per cent claimed to be traditionalist. Majority (75%) of the respondents affirmed that their major occupation is farming while 25 % of were involved in farming and other sources of livelihood. This finding also corroborates with the result obtained during the focus group discussion. Specifically, the discussants said *that their major occupation is farming especially cassava farming but that they also involve in other sources of livelihood such as petty trades, local soap production etc. in order to meet up with their family needs* (FGD, 2017). Responding on monthly income received, Table 1 revealed that 75 per cent of the respondents receive 10,000-20,999 Naira as their monthly income revolves within the minimum wage receivable by civil servants in the study area. Responding during the FGD, majority of the discussants stated that *their monthly income received from their farming business has not created much impact in their life and called for government supports in farming activities.* Table 1 further revealed that household size of 7 and above recorded 50% while 6-7 household size recorded 25%. During the FGD, majority of the discussants admitted that *one of the reasons for high percentage in household size is due to polygamous system of marriage that is allowed in the study area* (FGD2017). The household size is an indication of the pressure on income of household members. The finding provides data that have policy implications on family health programme and developmental issues such as child spacing, housing and provision of basic social amenities by government and private service providers in the study area.

5.2 Level of involvement of the respondents in cassava value chain and its commercialization

A four-point Likert-type scale of very high (4), High (3), Low (2) and very low (1) was adopted to determine the level of involvement of the respondents in cassava value chain and its commercialization in the study area. Response(s) of a mean score of 2.5 and above were regarded as high while those with mean scores of less than 2.5 were regarded as low participation. Specifically, Table 2 revealed a high involvement in production and marketing of fresh cassava tubers with a mean score of 2.70 while other factors such as production and marketing of cassava flour (1.73), production and marketing of cassava starch (1.63), processing and marketing of garri and fufu (2.00), marketing and processing of cassava into ethanol (1.85), processing of cassava into animal feeds (2.10) and processing and marketing of cassava feeds (2.20) recorded low level of participation.

Table 2: Mean scores on level of involvement of the respondents in cassava value chain and its commercialization

Variables	Mean	Decision
Production and marketing of fresh cassava tubers	2.70	High
Production and marketing of cassava flour milling	1.73	Low
Production and marketing of cassava starch	1.63	Low
Production, processing and marketing of garri and fufu	2.00	low
Marketing and processing of cassava into ethanol	1.85	Low
Processing of cassava into animal feeds	2.10	Low
On farm/rural processing and marketing of cassava chips	2.20	Low

Source: Field survey 2017

This result corroborates with the answers obtained during the focus group discussion whereby majority of the discussants admitted that their farm produce (cassava) were sold in fresh cassava tubers. It was further revealed during the focus group discussion that majority of the respondents were not aware of the value addition in cassava not to talk of participating. Specifically, one of the discussants stated that *"I prefer to sell my farm produce (cassava) immediately to the end users so that it will not get rotten, moreover, we don't have the equipment and the technological know-how of value addition in cassava though I have seen spray starch, flour etc. but I never knew these products are obtained from fresh cassava. The discussants concluded by calling on government and other private service providers to come to their aid by organizing workshops and other enlightenment programs on value addition in cassava to enable them participate effectively and generate more income"*

Table 3: ANOVA result on the level of participation of the rural women in cassava value chain and its commercialisation

SOV	SOS	df	MS	f-cal.	f-tab	Remarks
Between groups	0.06	5	0,01	0.03	2.25	Not Significant
Within group	12.73	36	0.35			
Total	12.79	41				f-cal.< f- tab. @ 5% level

Result from Table 3 indicates that the null hypothesis which states that there is no significant difference among rural women involvement in cassava value chain and its commercialization was accepted at 5% alpha level. Accepting the null hypothesis implies that the rural women across the participating communities participated at the same level (low level) in cassava value chain and its commercialization.

5.3 Constraining factors to effective rural women involvement in cassava value chain and its commercialization

A four-point likert type scale of strongly agree (4), agree (3), disagree (2) and strongly disagree (1) was adopted in identifying the limiting factors to effective rural women participation in cassava value addition and its commercialization in the study area. Response(s) of a mean score of 2.5 and above were regarded as 'agree' while those with mean scores of less than 2.5 were considered as 'disagree'. Table 4 revealed that lack of access to productive resources was considered as one of the militating factors to effective rural women participation in cassava value addition and its commercialization in the study area. This result corroborates with the findings of Rahman (2004) in

his study on gender differential in labour contribution and productivity in farm production that rural women in Nigeria form an active and reserve labour force but they rarely own the means of productions. The respondents were also in agreement that non-involvement of women in decision making constituted a barrier to their effective participation in cassava addition and its commercialization. The responses from the selected discussants during the focus group discussion were also in agreement that women are not allowed in decision making process by their men counterparts. Specifically, one of the discussants during the focus group discussion stated as follows:

The way our men are treating us each time it comes to decision making is not encouraging at all. They treat us like second class citizens and our voice are not heard when it comes to decision making in our various families. If I may ask, are we not human being? Men should give us the opportunity to take decision on issues that affects the women especially on assess to productive resources such as credit facilities and land ownership to enable us to participate actively in any development agenda (FGD, 2017).

Table 4: Mean scores on constraining factors to effective rural women involvement in cassava value addition and its commercialization

Factors	**Mean**	**Decision**
Lack of access to productive resources	4.00	Strongly agree
Non-involvement of women in decision making	3.60	Agree
Lack of formal education and training	3.50	Agree
Inappropriate financial services	3.70	Agree
Lack of extension services	3.40	Agree
Cultural barriers on land ownership to women	3.80	Agree
Non accessibility to appropriate marketing facilities	3.70	Agree
Lack of appropriate cassava processing technologies	3.50	Agree
Lack of information	3.60	Agree
Social problems such as kidnapping and arm robbery etc.	3.70	Agree

Source: Field survey, 2017

Lack of formal education and training recorded a mean score of 3.50. The study had already revealed that 60 per cent of the respondents had no formal education and train on the various ways of adding more value in their produce (cassava production). Other inhibiting factors included inappropriate financial services (3.70), lack of extension services (3.40), Cultural barriers on land ownership to women (3.80), Non-accessibility to appropriate marketing facilities (3.70), Lack of appropriate cassava processing technologies (3.50), Lack of information (3.60), Social problems such as kidnapping and arm robbery etc. (3.70). These findings as indicated in Table 4 corroborates with the responses obtained during the focus group discussion. During the focus group discussion majority of the discussants were in agreement that the above factors were ban to effective participation in cassava value chain and its commercialization.

6. CONCLUSION AND EXTENSION IMPLICATION

The study concluded that the rural women involvement in cassava value chain and its commercialization were low due to cultural practices that ban women from land ownership and access to credit facilities.

The extension implication of this study, therefore, is for government and other private service providers to create an enabling environment through policy dialogue on gender mainstreaming in the

area of land ownership and access to credit facilities to engender effective participation of rural women especially in cassava value-chain and its commercialization. These will increase per capita food production and raise rural women incomes who are active participants in cassava production in the study area.

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Back to Table of Contents

COMMERCIALIZATION OF SMALLHOLDER FARMERS IN SOUTH AFRICA: A MYTH OR A REALITY.

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ABSTRACT

This paper seeks to discuss and assess the concept of commercialization of smallholder farmers whether it is a reality or a myth. The focus of the study area was Mutale Local Municipality, in Vhembe district of Limpopo Province in South Africa, drawn from 4 areas namely Tshipise, Tshixwadza, Tshishivhe and Masisiwho by using a sample of 153 smallholders drawn randomly. The problem of the study was that there are more than 4 million households engaged in agriculture in South Africa who are scattered and are engaged in subsistence farming, if these farmers were to be commercialized, they would contribute beyond food security, grow the economy and create job opportunities. The farmers were engaged in vegetable cultivation under irrigation, dryland maize and citrus fruit farming. Data were collected through a structured qualitative and quantitative questionnaire that was administered face-to-face to respondents and the data was analysed by using a computer programme of the SPSS Version 24.

The findings are divided into three areas namely demography; commercialization process and its interpretation, and the challenges faced by farmers. For example we found that commercialization is not an easy process, its determinants are based on socio-economic characters, majority of farmers produce low 88%,generate low income from farming, but depend on off farm income like old age grants, female headed households focus in food security while men headed households grow cash crops and high value crops, farmers need support to access resources, there is a need for training 46.4 %,, Their challenges is access to resources 92 %, such as mechanization and irrigation water 80%, and distance to the markets 60%. The paper concludes by making recommendations; the state should intervene through policy to assist farmers to commercialize, provide effective advisory services and to train the smallholder farmers to produce market surplus in order to commercialize.

Keywords: Smallholder, Farming, commercialization.

1. INTRODUCTION

Smallholder farmers play a very important role in feeding millions of people not only in South Africa but around the globe, yet they are not always given the recognition they deserve; the question is why? This paper therefore discusses some of the factors that need to be considered that can bring smallholders in the pedestal of development such as being commercialized to play a much huge role in development. The concept of smallholder commercialization is explored in detail, whether they can be commercialized, is it a reality or a myth in South Africa. Commercialization of smallholder is possible, but it is not easy to achieve its sustainability as well as maintaining it at that level of productivity (Kirsten et al.,2013). One of the challenges is that there are more than 4 million households engaged in agriculture in South Africa (Stats South Africa, 2016) who are scattered and

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are engaged in subsistence farming, if these farmers were to be commercialized, they would contribute beyond food security, grow the economy and create job opportunities. The second reason is that there is a lot of issues that are needed to implement commercialization. For example, one need to have a clear meaning of the concepts used. What does commercialization and smallholder mean. Is there a country which has successfully commercialized its smallholder farmers? This paper provide evidence based on literature and the empirical evidence from Mutale Local Municipality. The paper seeks to achieve the following objectives:

- To define the meaning of commercialization.
- To identify problems faced by farmers when they commercialize.
- To provide empirical evidence of the survey on commercialization.
- To identify strategies for commercialization. And to make recommendations.

The next section provides the theoretical background of the paper.

2. THEORETICAL BACKGROUND

Literature revealed that the subject of smallholder commercialization has received attention and studies were conducted in different countries such as Europe;(Labarthe. 2012; Eicher & Staatz,1985; Sub-Saharan countries and South Africa: Kirstin, et al., 2013; Ghana: Martey, et al. 2012; Kenya: Karani & Wanjoh, 2017; Ethiopia, Gebre-Ab. 2006; Abera, 2009, Swaziland; Kiribege, 2016).

Lessons drawn from these studies are discussed in this paper. Agriculture is considered very important in all the countries where the studies were carried out. The south African government has identified it also as key mover in rural development and in creating jobs (National Development Plan, 2012). Apart from job creation, it is noted that agriculture produce faster growth, reduce poverty and sustain the environment if it is made to work in concert with other sectors of the economy (World Bank, 2007:2). Agriculture contribute to the development of a country. Abera (2009) identified three levels why agriculture is important. In the first level it serves as an economic activity, at second level, it provides a source of livelihood and at the third level is a provider of environmental services. It is reported that there are over six million households who are engaged in smallholder agriculture in South Africa (Statistics South Africa Labour Force Survey (200-2007).

In order to realize a transformed agriculture of the smallholder farmer have to increase income and welfare outcomes, and in the process, they will be working to fight for the reduction of poverty, and the promotion of food security. Prior to 1994 there were 55 000 commercial farmers in South Africa. However, the size has been reduced to 35 000. These commercial farmers are vital to the food security of 54 million of South Africans (Cronje, 2015). One of the approaches that can achieve increasing agricultural activity is through commercialization. The concept of commercialization of smallholder farmers cannot be explained in one word because according to Mahaliyanaarachchi *et al*. (2006), is complex. It can be explained from both input and output side of production. In the input side, commercial farming is farming for profit; food is produced by advanced technological means for sale in the market, often very few workers are employed.

The reason why it is complex is because there are various perceptions about what it is, and how it can be carried out in practice. Another reason why commercialization for smallholder is complex is that smallholder farmers involve millions of households who are scattered in rural areas where they need to be organized and be supported. These small-scale farmers focus in production with the priority on home consumption, it is only when there is surplus which is marketed in order to generate income to fulfil other households needs in South Africa. Stevens (2017) asserted that, it is not

sufficient to focus on production agriculture, but to link it to agribusiness and agripreneurship. The writers have no doubt that this can be interpreted as commercialization.

There is different understanding about the subject of smallholder and commercialization. Different authors have made contribution to make this concept be understood. According to Kirsten (et al. 2013) smallholder farming is divided into three levels, subsistence, semi commercial and commercial. This was asserted by Pingali & Rosegrant (1995) who call the semi commercialized stage a "transition stage "to commercial farming.

3. RESEARCH METHODOLOGY

The study was conducted in the Mutale Local Municipality, Vhembe District of South Africa on a proportionally randomly selected sample of 153 smallholder farmers after clustering them into agricultural zones (Tshipise, Tshixwadza, Tshishivhe and Masisi) and commodity groupings (vegetables under irrigation, dryland maize and citrus fruit farming). Data were collected through a structured qualitative and quantitative questionnaire that was administered face-to-face to respondents (smallholders and extension officers) and captured into the SPSS Version 24 computer program.

4. RESULTS AND DISCUSSION

4.1 Demography

Socio-demographic characteristics relating to gender, age and educational level of farmers, household and their main income sources are shown in Table 1.

Table 1: Socio economic characteristics of respondents

Farmers attributes		**Percentage**
Gender	Male	43.8
	Female	56.2
Age	Youth: ≤ 35	9.8
	Aged: 36-59	47.1
	Elderly: > 59	43.1
Educational level	Never attended	23.5
	Primary	32.7
	Secondary	32.0
	Tertiary	11.8
Household income/month	Low income:<5000	88.2
	Middle income:5000-10000	8.5
	High income:>10000	3.3
Main sources of income	Agriculture	17.0
	Formal employment	8.5
	Informal employment	11.1
	Social grant	45.1
	Mixed	5.2
	Other	13.1

According to Table 1, the study revealed that most respondents, 47.1% were between the age of 36 and 59 years with relatively low youth participation (9.8%). As regards to the participation of men in smallholder farming, the study found that females were the dominant gender (56.2%). The finding

regarding the dominance of female farmers is appreciated as it is in line with government policy of women empowerment and emancipation (Alunga & William, 2013).

The results show that the majority (88.2%) of farmers were characterised by low monthly income ranging between R100-R5000 while a few (3.3%) were within the high-income group (above R10000 per Comparatively, most (45.1%) farmers generated their income from social grants rather than from farming (17%). Informal- and formal employment activities were the main income sources of the least number of households (8.5% and 11.1% respectively).

4.2 The importance of commercialization

The importance of agriculture and agricultural extension in development has been identified by a number of researchers both in developed as well as in developing countries (Van den Ban & Hawkins, 1990) however the need to commercialize agriculture has been seen as one of the solutions to growing the economy and to alleviate poverty. The need to link smallholder farmers to markets was also stressed (Stevens 2017). In a fully commercialized agriculture, it is noted that inputs are predominantly obtained from markets and profit maximization becomes the farm household's driving objective (Pingali & Rosegrant, 1995).

4.3 The meaning of smallholder farming concept

Smallholder farmers are those marginal and sub-marginal farm households that own or/and cultivate less than 2.0 hectare of land and constitute about 78 per cent of Sub Saharan country's farmers, (FAO, 2012). Subsistence is a form of agriculture where almost all production is consumed by the household, often characterized by low-input use, generally provided by the farm. Farming is generally rain fed and production is mainly based on staple crops with low yields. Their main target is self-consumption (FAO, 2010).

4.4 What is meant by commercialization

Different authors see the definition differently for example (Ghana paper) Agricultural commercialization refers to the process of increasing the proportion of agricultural production that is sold by farmers (Pradhan et al. 2010). Commercialization is assumed if it is producing a significant amount of cash commodities, allocating a proportion of its resources to marketable commodities, or selling a considerable proportion of its agricultural outputs (Jaleta, et al. 2009). The question to be asked could be to check whether there is any success story elsewhere to learn from.

Literature reported that there have been pockets of success stories in the following countries: Malawi, Zambia, Tanzania, Uganda, and Mozambique, within the International Centre for Tropical Agriculture (CIAT) under a program entitled the Enabling Rural Innovation (ERI) which focussed on building small-scale farmers to have capacity to produce for the market (Kirsten, et al.2013). One success story recorded is coming from South-Western Uganda where small-scale potato farmers were successfully linked to high value markets.

5. FACTORS PROMOTING SMALLHOLDER COMMERCIALIZATION

A number of studies were conducted to check the viability of them being commercialized (Kenya, Ghana Matey, and South Africa Kirstin et al., 2013, Ethiopia (Gebre-Ab,2006, Mutale Local Municipality in Limpopo, South Africa, Nekavhambe, et al. 2017). It is noted that factors that promote smallholder commercialization include improved physical infrastructure such as roads,

railways and ICT facilities (Sibale, 2010). Improved access to natural resources, increased adoption of new technologies, level of specialization in fewer staple food and cash crops coupled with availability of assured markets through contracts and legal agreements are also vital in promoting increased commercialisation of smallholder farmers (Sibale, 2010). Respondents were asked to indicate determinants of commercialization and the findings is reflected in Table 2.

Table 2: Determinants of commercialization

Determinants for commercialization		**Percentage (%)**
Credit access	Access to credit	13.1
	No access	86.9
Training access	Access to training	46.4
	No access to training	53.6
Membership to agricultural organisations	Access to agricultural organisations	22.9
	No access to agricultural organisations	77.1
Market support service access	With access	54.6
	With no access	43.6
Farming inputs access	With access	28.1
	With no access	71.9

According to Table 2, Experience show that in many occasions this support was found either inadequate or lacking in the farmer's environments. What might worsen the situation could be lack of agro – industries or well-functioning markets locally. In the case of South Africa there are effective markets in big cities and to transport products to these markets are costly. Under these circumstances a smallholder farmer competes with established commercial farmers if the quality of the products is questionable, he becomes a loser instead of becoming a beneficiary. Apart from these factors, a smallholder farmer who aspire to commercialize his farm need to have an entrepreneurial spirit, coupled with managerial skill of his enterprise (Eicher & Staatz, 1985).

5.1 Criteria to commercialize farmers

It should be noted that commercialization is a process. A person doesn't just wake up one morning and say he is commercializing his farm. There must be some characteristics which he needs to observe over a period. Some of the things he may need to check is whether he produce marketable surplus. According to Mahaliyanaarachchi (et al. 2006) marketable surplus in the context of agricultural produce refers to the quantities of products available for consumption by the non-farming population and also as raw materials for manufacturing and processing industries. If one takes this into consideration, one is able to determine whether the kind of the product can be commercializing or not. This scale is developed and can be used if the farmer produces and out of his total production market less than 25 % of his total production he is equated as subsistence farmer. However, if his Marketable surplus is ranging between 25-50% of total production, he can be called a semi commercial or a transition farmer, if his: marketable surplus is more than 50% of the total production he qualifies to be called a commercial farmer (Mahaliyanaarachchi et al. 2006). Other

others noted that in order for a farm to qualify to be successfully commercialized, it is determined by the socio-economic characteristics of smallholder producers. It was demonstrated according to Kirsten et al. (2013), that crops that are mainly produced for the market (tobacco, paprika and cotton) are controlled by the male member of the household, while the female headed household focus on food security related crops that do not attract the market. The availability of labour from the household is another important determinant.

5.2 Stages in the commercialization

Experience suggested that the process of agricultural commercialization usually takes a long transformation process from subsistence to semi-commercial and then to a fully commercialized agriculture (Pingali & Rosegrant 1995). There are three stages that have been identified namely; the subsistence, the transition stage, and the commercialization. Farmers have to be assisted if they wish to move out of this stage that is from subsistence to semi commercialize. Many smallholder farmers were found to be operating under subsistence which they depend on rain water.

6 CHALLENGES OF COMMERCIALIZATION

6.1 Inadequate availability of produce

Sibale (2012) observed that one critical challenge of commercialization is that agricultural commodities has been inadequately produced to meet industrial demand. One of the causes could be because they are scattered, as such they need to be organized.

6.2 Low productivity

Smallholder farmers have tendencies to produce less despite favourable ecological conditions. Kirsten et al. (2013) found that some of the challenges of low productive farming include declining soil fertility, pest and disease outbreaks and land fragmentation. Smallholder farmers are typically poor and practice low input agriculture, not by choice but due to poverty. This results to low productivity and production. Big buyers find it problematic to deal with this category of farmers due to inconsistency and unpredictability of supply (Sibale 2010). Other authors have reported that the average maize yield per hectare in wealthy countries like Canada is three times higher than the average maize yield in Sub Saharan African low-income countries (Verdier-Chouchane & Karagueuzian, 2016).

6.3 Poor access to resources

Kibirige (2016), found that household commercialization index (HCI) was low and this was attributed to several factors including limited access to natural, physical, labour, and financial resources, and import for increased production of marketable surplus. Therefore, policies and rural development programmes geared towards improved access of these resources by resourced -poor smallholders should be initiated or catalysed by the government and other development agencies to boost productivity and markets access (Kibirige, 2016). This point was further noted that many smallholder farmers practice rain-fed agriculture, with poor formal education, and this fact plus the inherent low resource base relegates smallholder farmers to less productivity (Dorward, et al. 2003). It is a doubtful fact that without resources it would be difficult to commercialize smallholder farmers. Farmers were asked to indicate the challenges that they experience, the result is indicated in Table 3.

Table: 3: Major challenges faced by farmers in the Mutale Local Municipality

Challenges faced by farmers in their farming activities	Percentages (%)
Low mechanization	92.8
Shortage of water	80.4
Poor infrastructure	69.3
Poor safety and security on farm property	17.0
Pest and disease	17.6
Distance to markets	60.7

(Source: survey, 2016, n=153)

The following challenges emerged: pest and diseases, lack of access to inputs and distance to markets. For example, mechanization (technology) was regarded as the main problem facing many respondents (92.8%). Many respondents (80.4%) ranked shortage of water as the second main constraint in their daily farming activities. More than half of the farmers also pointed out that infrastructure and access to market and long distance from the point of farming is still a challenge in the Mutale area, 69.3% and 60.7% respectively.

7. STRATEGIES TO SUPPORT COMMERCIALIZATION

Commercialization of smallholder has been found possible in the sub-Saharan countries and in other countries of Africa such as Tanzania, Malawi, Kenya, however found that not all successful smallholder commercialization efforts are sustainable over the long term (Kirsten et al, 2013). Those who were found sustainable were the ones that the private or Government have managed to establish a capacity among them to enable them to manage their enterprise from a business perspective. One strategy asserted by Kirsten et al. (2013), which can be used to promote sustainable commercialization is when the authorities either the government or the private sector agree to provide consistent and comprehensive support to assist smallholder farmers to overcome pre-existing bottlenecks along the agricultural value chain.

7.1 Give them the knowledge and training

There are different knowledge systems which farmers know, for example technical knowledge, general knowledge which sometimes is known as common sense, and there is indigenous knowledge which farmers have been using but some technocrats discourage them. Smallholder farmers need to have access to reliable knowledge. This kind of reliable knowledge should be made available without any major financial difficulties (Mahaliyanaarachchi, et al. 2006). By exposing smallholder farmers to knowledge, they will ultimately become strong because knowledge is power.

Farmers whether smallholder or not will treasure information in order to make decision. According to Karani & Wanjoh, (2017), identified information needs like: gross margins for a particular farm produce, possible markets, stability of the produce in the market, availability and price of inputs and projected transportation costs for inputs. In addition to the price information, it was found that farmers also require information such as weather forecasts, advice on crop production, marketing and use of appropriate seeds and fertilizers (Awasthi, 2007).

7.2 Leadership and directing

Leadership can make or break attitude of farmers. It is the observation of the writer that there is general behaviour which may not mean much to an ordinary person but for ensuring that the right relationship develops for an aspiring farmer to become an agripreneur, the need for effective leadership in the beginning of his process is essential. He should be able to reflect and avoid those common pitfalls that come with the willingness to change and become better which in most cases become hard to unlearn things like not honouring credit once provided or using it for something else other than for the purpose it was acquired for. There could be times when things do not work well for his clients, he should be able to offer an apology and promise to correct it in future.

It is not good to assume that the other person will understand, hiding under the fact that "I am a small-scale farmer" when in a real business transaction, good behaviour count. It is the writer's observation that this behaviour needs to be improved. Smallholder farmers should understand issues of quality and management of their products if they are to maintain a commercialized business enterprise. Experience has shown that some farmers are not worried of ensuring that they produce quality products which will fetch high price at the market. If they belong to strict farmer organizations whose business value have proven record, they can learn from such organizations. For example, Compliance to standing rules of the game for example to comply to Global Good Agricultural Practice (Global GAP).

7.3 Providing cost effective production advisory services

Farmers need regular information on production advisory services such that ICTs offers at cost effective and efficient means of providing this information (Kibirige, 2016). Agriculture is becoming increasingly knowledge-intensive and high-technology therefore an advisory service should be able to guide farmers with such knowledge. It is reported that both public and private institutions have traditionally targeted smallholder services with SMS to empower farmers with appropriate production tips (World Bank, 2011). Commercialization will not be an overnight issue but a process which need to be guided through the number of activities such as follows:

7.4 Political will or state intervention

It is noted that for smallholder to be commercialized it is important that the government should intervene to provide investment to enable the process to take place (Kirsten, et al 2013).

7.5 Use of whether information

Smallholder agriculture in Sub Sahara Africa is largely dependent on rain water supply. This therefore implies that for farmers to optimise their productivity there is need for them to know in advance the rainfall season forecast and have a constant update of changing weather patterns (Verdier-Chouchane & Karagueuzian, 2016). Greater access to information seems to help farmers make better decisions around transportation and logistics, price, location, supply and demand, diversification of their product base, and access to inputs (Dixie & Jayaraman. 2011).

8. CONCLUSION AND RECOMMENDATION

The paper has demonstrated that commercialization of the smallholder farmers is possible. However, it is not something which can be achieved overnight, it needs time to ensure that vehicle to achieve it be fully prepared It has pointed out the meaning of commercialization, the importance of it in the country, the criteria to be considered before it is promoted, the challenges of farmers towards commercialization, and the challenges farmers face with a help of the Mutale local municipality

evidence of the challenges. It can be concluded that commercialization can be done but its sustainability hangs in the balance due to a need to sustain them through training, provision on ongoing comprehensive farmer support provision of finance to and to address the challenges are very important if we desire to see south Africa move towards this path. The following can be recommended:

- policy to support the initiatives towards commercialization. The government should demonstrate its willingness to support the process through state intervention which will provide investment.
- Empowering farmers through different means and tools to access critical information needed to take decisions in farming and transiting to commercial farming, proven information which is risk proven and easily available because information which is profit driven is not cheap from private sector.
- Training farmers. Strengthening extension services which will train smallholders in all aspects that will promote and sustain their managerial capacity to handle high value crops and developing a programme which uplift women farmers to pursue the commercial route because female headed house hold tends to focus on food security while men pursue cash crops which are easy to move towards commercialization.

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Back to Table of Contents

ECONOMIC IMPACT OF POOR MANAGEMENT OF NATURAL RESOURCES IN RURAL AREAS OF TSOLO.

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Back to Table of Contents

69

70

EVALUATION OF SOUTH AFRICA'S PUBLIC AGRICULTURAL EXTENSION IN THE CONTEXT OF SUSTAINABLE AGRICULTURE.

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ABSTRACT

South Africa's public agricultural extension services evolved from as early as the beginning of 1900. Agricultural extension is now recognised as a science by South African Council of Natural Science Profession (SACNASP). This paper presents a philosophical argument that the promotion of sustainable agricultural practices should remain the domain of public extension and advisory services. To provide context, the paper firstly defines agricultural extension and the role extension could play in promoting the five pillars of sustainable agriculture. Secondly, it evaluates the national policy on extension and advisory services to determine the extent to which it addresses the framework of the five pillars for sustainable agriculture. Thirdly the paper evaluates the Extension Recovery Plan (ERP), norms and standards for agricultural extension and the National Development Plan (NDP) against the framework of sustainable agriculture. The evaluation indicates that only three pillars of sustainability are emphasised. There is a need to subdivide the traditional pillars to align with the full framework for sustainability. The initial findings suggest that, while South Africa's agricultural extension policy often refers to sustainability and even to sustainable agriculture, they do so using the traditional three-pillared framework of economic, environmental and social sustainability and thus fall short on key elements essential to sustainable agriculture – namely maintaining and increasing biological productivity, decreasing the level of risk to ensure larger security, protecting the quality of natural resources, ensuring agricultural production is economically viable and ensuring agricultural production is socially acceptable. The paper also explores government initiatives to support extension and advisory services. Finally, this paper concludes by giving emphases that the national policy on extension and advisory services should be amended to suit the five pillars of sustainable agriculture.

Keywords: Sustainable agriculture, extension and advisory services, extension, pillars of sustainability, agricultural policy.

1. INTRODUCTION

The continued provision of food, fuel and fibre to a growing world population depends, in large measure, on the practice of sustainable agriculture. This paper argues that, in the case of South Africa, adoption of sustainable agricultural practices falls in the domain primarily of public sector agricultural extension (DOA, 2014). It is thus valuable to understand the extent to which South Africa's public extension service is positioned to promote sustainable agriculture amongst the farmers it serves. This paper first examines the discipline of agricultural extension in the context of sustainability and discusses the role it should play in promoting sustainable agriculture. The paper

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then presents a brief outline of the evolution of public sector extension in South Africa, and argues that, given the role extension has played over the last several decades, the state extension service should be well-positioned to promote sustainable agriculture even if this has not been its primary focus in the past. Further, because extension services are driven by policy, the paper next examines the extent to which current South African national policy guiding extension and advisory services supports the promotion of sustainable agriculture using the five pillars of sustainable agriculture established by Khwidzhili and Worth (2016). Other initiatives to support extension and advisory services are also discussed.

2. OBJECTIVES OF THE PAPER

The main objective of this study is to evaluate public agricultural extension in South Africa and its alignments to the five pillars of sustainable agriculture. This entails the following:

- Defining agricultural extension and the role it plays in the agricultural sector;
- Providing an overview of the evolution of agricultural extension in South Africa;
- Evaluating the current national policy on extension and advisory services and other public documents in the context of South Africa's extension services' position to promote sustainable agriculture with specific reference to the five-pillars framework; and
- Providing guidance to policy makers for incorporating all the five pillars of sustainable agriculture when developing agricultural extension policy and programmes.

3. RESEARCH METHOD

This was a desk-top study examining relevant policies documenting the involvement of South Africa's public extension services in the context of sustainable agriculture. The data analysed were drawn primarily from existing articles, documents and policies filtered through the five pillars of sustainable agriculture to identify embedded themes and recurring patterns of meaning and relationships (Cohen *et al*, 2011). This is a review paper based on already existing literature (Yin, 2003), i.e. secondary data. The following documents were evaluated as they were found to be relevant to the delivery of agricultural extension in South Africa: national policy on extension and advisory services; extension recovery plan; and the norms and standards for agricultural extension and the national development plan.

4. THE EVOLUTION OF PUBLIC AGRICULTURAL EXTENSION IN SOUTH AFRICA

The evolution of agricultural extension in South Africa dates back to the reconstruction that followed from 1902 when agricultural scientists were imported from England. Drawing from expertise of outsiders was futile as they were unfamiliar to South Africa's local conditions. In response, in 1907, the first cohort of potential South African scientists was identified to study abroad (Van Vuuren, 1952).

Agricultural extension started to take shape in South Africa around 1925, supported by the then National Ministry of Agriculture. The Ministry had approved about six agricultural advisors (extension officers) to serve the entire country in rendering extension services. The primary role of extension from its initial stage was to assist farmers to make decisions that will better their farming practices and ensure food security in the country (Koch & Terblanche, 2013). In the early 1940s, agricultural extension was incorporated as an academic career within institutions of higher learning. This was initiated by the University of Pretoria, University of Stellenbosch and Elsenberg College of Agriculture where the faculties of agriculture were established (Van Vuuren, 1952). Over the ensuring decades, other South African universities and colleges started to offer agricultural

extension. Among these are the Universities of Fort Hare, KwaZulu-Natal, Limpopo, the North West, and Venda, the Cape Peninsula University of Technology and Tshwane University of Technology (Koch & Terblanché, 2013). The now eleven agricultural colleges have also played an important role in training in agricultural advisors, particularly for the former so-called homelands. Concurrent with the expansion of extension in higher education, the profession of extension grew, and in 1966, the South African Society of Agricultural Extension (SASAE) was established at the University of Pretoria as a professional body supporting the extension practitioners.

Despite its inclusion in higher education programmes, and despite its contribution to the livelihood of farmers and the agricultural economy, for eight decades after the establishment of extension, agricultural extension was not considered as a science by the South African Council of Natural Science (SACNASP). However, the SASAE championed the cause of extension with SACNASP, and since 2013, agricultural extension has been officially recognised as a science (extension science) with three possible categories of registration (depending on the nature of the exention practitioner's qualification). The categories are: professional (post-graduate degree in agricultural extension coupled with relevant experience); candidate (supported by a degree in agriculture with no experience in extension); and certificated scientist (supported by a degree in agriculture and least experience in agriculture).

The adoption of the South African Constitution in 1994 established that board extension policy (as an element of national aspects of agriculture) would be a national competency, while the delivery and management of extension to famers would be done through the provincial governments, with substantial latitude regarding modes of operation, operational focus and developmental priorities. This resulted in nine separate extension services, which, while being bound to broad national policy, are not subject to any meaningful national coordination or collective accountability; rather they are solely accountable to the provincial legislatures and governments and ultimately individual provincial political leaders (Worth, 2012).

5. PUBLIC AGRICULTURAL EXTENSION PERSPECTIVE AND THE ROLE IT PLAYS IN AGRICULTURE

There is no single definition that can be used exclusively to define agricultural extension. According to the then South African Department of Agriculture (2005), agricultural extension is the art of assisting commercial, small-scale and subsistence farmers with agricultural related knowledge and skills that will make them productive, competitive to ensure sustainability (Hedden-Dunkhorst & Mollel, 1999). Van den Ban & Hawkins (1997) earlier defined extension as the conscious use of communication of information with the aim of assisting people to make good decisions. Purcell & Anderson (1997) similarly confirm that agricultural extension is a key element in enabling farmers to obtain information and technologies that can improve their livelihoods. The concept of a livelihood is broader and more comprehensive and integrated than simply 'farming'. A livelihood is a means of supporting one's existence most often through multiple strategies of which, for farmers, farming is one.

Most commonly, extension generally is viewed a process of working with farmers or farming communities to help them acquire relevant and useful agricultural or related knowledge and skills in order to increase farm productivity, competitiveness, and sustainability (Duvel, 2004). However, in practice, it is a continuum ranging from the narrow technology transfer focusing specifically on farming practices within the specific context of an agricultural enterprise, to advisory services that address farming and related practices in the wider context of social, economic and environmental

perspectives including education, human development and critical public priority issues such as food security, poverty alleviation, environmental degradation, and social equity (De Klerk *et al.*, 2004).

Increasingly, the role of agricultural extension extends beyond technology transfer with primary aim of assisting farmers to adopt new technology. Extension's role encompasses linking farmers to domestic and international markets, assisting farmers reduce their vulnerability and enhance their livelihoods, promoting environmental conservation (Alex *et al*, 2001), and taking a leading role in rural development and even non-farm employment (Riveria, 2001). Extension is expected to include strengthening innovation processes and building linkages between farmers and other agencies and assist farmers to bargain for inputs and access credit to advance their farming practices (Aneato, 2012). In this expansive context, it is evident that agricultural extension requires a holistic approach.

Agricultural extension is an important factor in promoting agricultural development (Birkhaeuser *et al*, 1991; Anderson & Feder, 2007). Most governments in sub-Saharan Africa, including South Africa, have invested in agricultural extension as the primary tool for improving agricultural productivity and farmers' income. In South Africa, agricultural extension is used to support agricultural development and specifically to play a pivotal role in educating farmers to practice more efficient and profitable farming. It is, thus, posited that South Africa's public agricultural extension should be well-suited to promote sustainable agriculture.

Agricultural extension services depend upon knowledge, skills, and insights concerning the multifaceted process of behaviour change (Griffith, 1994). While extension should help teach new farming practices and assist rural people to build leadership and organisation skills (Van der Ban & Hawkins, 1997), more recently, extension has experienced a major shift towards participatory models (Düvel, 2005) in which stakeholders take a more active role in agricultural extension processes and decision-making. Most recently is the introduction of a learning-based model that emphasises the need to build capacity for learning throughout the extension system, but especially among the farmers for which learning is described as the capacity to engage with scientific enquiry (Worth, 2006).

Error! Reference source not found. summarises some common agricultural extension models that are used in South Africa:

: Extension models

Models	***Core principles***	***Implications***
Linear	- Top-down approach - Based on extension expertise - The farmer is the recipient	- Farmers cannot solve their problems - Adoption of technology is not questionable by farmers - Farmers less interested
Advisory	- Farmers solve their problem - Extension required on farmer's - request - Based on farmer's expertise	- Extension is the last option - Extension has less influence - Farmer solve their own problems
Participatory	- All stakeholders participate - Encourage mutual respect - Joint problem solving	- Everyone feels important - Expertise from both participants

Models	*Core principles*	*Implications*
Learning	- Based on learning from each other - Based on continuous reflection from - both parties - Collective decision is taken and based on both party's expertise.	- Create sustainable relation - Encourage learning and research - Some participants might be illiterate

Adapted from Abdu-Raheem & Worth (2011)

Depending on the aim and objective of an extension engagement or intervention, different extension models are used by extension. The first extension model in **Error! Reference source not found.** is called the linear model with focuses on transfer of technology in which the (mostly off-farm) extension research centre is the source of technology and innovation that is then 'transferred' to farmers who 'adopt' the technology (Rölling, 1995). This is a so-called 'top-down approach' because the farmer is only the recipient of technology that has been designed and delivered 'from above.' The linear model requires high-level knowledge from specialised scientist and specialised extension skills to disseminate innovations to farmers (Dexter, 1986). However, not all farmers will adopt all new technology from extension practitioners, especially technology developed in their absence. Adoption of technology is influenced by the farmers' resources and their past experience. Thus, this approach is not appropriate in all cases, and should not be the 'default' approach.

The second extension model is the advisory model which views farmers as active problem solvers and will seek advice from extension only if they fail to solve their problems themselves (Rölling, 1995). The model encourages farmers to share information and learn from each other with least influence from extension services. The advice from extension comes as a request from the farmer. The model recognises and appreciates the role that farmers could play in problem solving.

The third model is the participatory model where the knowledge and expertise of farmers (often referred to as indigenous knowledge) that they have accumulated over generations (Agrawal, 1995), and perhaps more recently. This knowledge is best understood as local memory (the collection of practices handed down from past generations, but which is no longer used), local practice (knowledge compiled from various second-hand sources or unstructured trial and error), and/or local science (knowledge and practices currently in use or not a result of deliberate and conscious innovation and experimentation conducted by the farmer) (Masere & Worth, 2015). Local science would result from an extension engagement that employs a learning posture with the primary aim of building capacity of farmers to learn, innovate and experiment (Worth, 2006) systematically, methodically and deliberately. Thus, extension should recognise farmers' knowledge and should incorporate it in their work (Agrawal, 1995; Hart, 2003; Swanson, 2006).

The fourth model is a learning-centred model which focuses on learning amongst agricultural extension workers, researchers, farmers and other stakeholders. The model is based on continuous reflection amongst all stakeholders within the learning process (Worth, 2006). This model was evolved from the facilitation model and Chambers' (1997) Participatory Rural Appraisal (PRA). It is grounded in Kolb's (1984) learning theory which embraces the iterative process of analysing, planning, acting, monitoring and evaluating (i.e. observing, reflecting, conceptualising and actively experimenting).

As noted earlier, no one extension model is suitable in all contexts. However, it can be argued that the participation of both the extension practitioner and farmers in addressing farmers' issues can yield profound benefits. It is thus imperative, whatever model is applied, that learning should be

encouraged and promoted, as it is the basic component of knowledge management. Each stakeholder should be treated with respect and be afforded the opportunity to display and apply their expertise.

These shifts in approach and process suggest that extension services respond well to working within the bounds of theoretical frameworks, including those guiding sustainable agricultural practices (Rivera, 2006). Existing frameworks could be adopted, adjusted or developed and adapted to extension's multiple roles ranging from advisory, technician, educator, middleman, facilitator, analyst, researcher and learning partner (Bembridge, 1991; Van den Ban & Hawkins, 1997; Department of Agriculture, 2005, Düvel, 2005; Worth 2006). Globally, public agricultural extension in faced with a huge challenge of being relevant and effective. To achieve this, it is essential to develop and implementing relevant frameworks.

A case in point is a framework for sustainable agriculture. Currently, with regard to sustainable agriculture, agricultural extension advises farmers based on the three traditional pillars of sustainability, namely, economic, environmental and social viability (Magoro & Hlungwani, 2014). However, more current thinking suggests that a five-pillar framework should be applied (Khwidzhili & Worth, 2016): maintaining and increasing biological productivity; decreasing the level of risk to ensure larger security; protecting the quality of natural resources; ensuring agricultural production is economically viable; and ensuring agricultural production is socially acceptable.

The national policy on agricultural extension and advisory services has clearly defined the role of agricultural extension agents. The study also supports the four extension models described by Abdu-Reheem & Worth (2011) which extension can use to promote sustainable agriculture. As noted, no single approach suits all environments; extension will have to choose approaches that will be relevant to their target clients (farmers), their situations and the issues to be addressed.

However, the failure of the exclusive use of conventional top-down approaches which excluded farmers participation is well documented. Thus, in general, agricultural extension should prioritise participatory approaches when engaging farmers. Leeuwis and Van den Ban (1996), for example, argued that farmers should be involved directly in the planning of agricultural extension activities. Participatory agricultural extension encourages joint learning amongst farmers (Hagmann et al, 1999; Wettasinha et al, 2003). Promoting participation of farmers in the extension process reduces barriers that impact the rate of adopting sustainable agricultural practices (Ajeigbe & Dashiell, 2010). Specifically, according to Nagel (1997), understanding, working with, accommodating and otherwise building on the local knowledge of farmers helps promote sustainable agricultural practices.

Early in the provision of extension to smallholder black South African farmers, Bembridge (1979) argued that extension services were meant to transfer skills and knowledge to farmers. This suggests that the knowledge and skills held within the agricultural extension system should be assessed and updated on a regular basis to ensure extension services stay relevant to the ever-changing agricultural landscape.

In addition to the knowledge and skills within extension and the choice of extension models and frameworks, the reach of the service is also an important factor. Williams et al (2008) reported that access to quality extension and advisory services depends on the ratio of extension to farmers. The lack distribution of extension and advisory services in South Africa was also highlighted as a major constraint for farmers (Nel & Davies, 1999; Van Niekerk, 2011, Ndoro et al, 2014). They argued that the distribution of extension and advisory services is relatively low among emerging farmers (who arguably have the greatest need for extension), compared to so-called commercial farmers. The poor distribution is a result that most emerging farmers depends entirely on public extension services

(Ngomane, 2000; Oladele & Mabe, 2010), while commercial farmers rely on private extension that is often costly. Similarly, the South African Extension Recovery Implementation Plan (2008), indicated a lack of adequate extension services in the country, indicating the ratio of extension to farmers was 1:1500, this figure is still high considering that some farms are commercial (the scope of work is extended) while others are producing on small scale. Additionally, factors such as low morale, lack of mobility, and low salaries were found to contribute to high turnover in the extension services, and make it difficult to attract recruits (Kaimowitz, 1991; Belay & Abebaw, 2004). The recovery plan was designed to address these various challenges in South African extension

6. REVIEW OF SECONDARY SOURCES

The study examined four public documents that are considered fundamental in promoting agricultural extension and advisory services in South Africa: National Policy on Extension and Advisory Services; Norms and Standards for Agricultural Extension; Extension Recovery Plan; and National Development Plan. A brief overview of these policies is presented below.

6.1 National policy on extension and advisory services (NPEAS)

South Africa developed a national policy on extension and advisory services in order to set a regulatory framework to guide public and private extension throughout the country (DOA, 2014). The policy states that extension and advisory services should be relevant, efficient, accountable and sustainable, and that extension should support sustainable agriculture.

The policy notes that South African extension faces "major challenges in the areas of relevance, efficiency, accountability and sustainability" and that it needs to be sufficiently flexible to "respond to a wide set of local, national and global pressures to the agriculture, forestry and fishery sectors across [many] value chains" (DOA, 2014:4). The policy does not specifically provide details on the sustainability of extension, but does provide some clues. The policy suggests that extension is sustainable when (DOA, 2014: 4-6):

- extension operates within a "developmental and systems approach" in which extension workers "have a holistic view and understand the total value chain and linkages";
- extension is governed and operates within operates on a common set of principles and values;
- extension genuinely responds to the needs, aspirations, opportunities and other circumstances of the many actors in the respective value chains
- extension workers trained with a multidisciplinary approach capacitating them with relevant and diverse knowledge and tools while retaining subject-specific technical knowledge and skills;
- extension reaches beyond just production aspects of farming and addresses other elements of the value chain and subsectors such as forestry and fisheries – and these in the context of sustainable economic development
- a holistic and collaborative approach is applied in a truly decentralized and pluralistic approach in which of all role-players stakeholders and service providers work together and share knowledge and information; and
- the extension service is directly accountable to clients at field level.

Figure 1 shows the proposed arrangement for coordinating and delivering extension in South Africa. The national Department of Agriculture, Forestry and Fisheries (DAFF) will establish a National Extension Forum whose members are drawn from public, private and NGO-sector stakeholders and role-players within the agri-food system. Each of South Africa's nine provinces (these includes

Gauteng (GP), Free State (FS), Mpumalanga (MP), Limpopo (L), Eastern Cape (EC), Western Cape (WC), Northern Cape (NC), North West (NW) and Kwa-Zulu Natal (KZN)) will have a provincial extension coordinating forum as well as district extension forums through the province (DOA, 2014). The forums will articulate, prioritise and coordinate the provision of extension and advisory services within their respective designated geographical areas.

Similar to the National Forum, provincial and district forums will comprise relevant stakeholders from the public, private and NGO sectors, including farmers and others in the value chain. The composition of the forum is determined by the policy and may be extended or reduced depending on the scope of the forum. Information relevant to coordinating extension should flow in all directions within the system – not merely top-down. This underscores the intended collaborative mode of this proposed approach to coordinating extension. It is also in keeping with operating holistically and collaboratively using a systems approach and makes extension more accountable at the 'field level' – all of which are needed to ensure the sustainability of extension. Although not expressly articulated in the policy, this proposed arrangement for coordination will also encourage and facilitate learning.

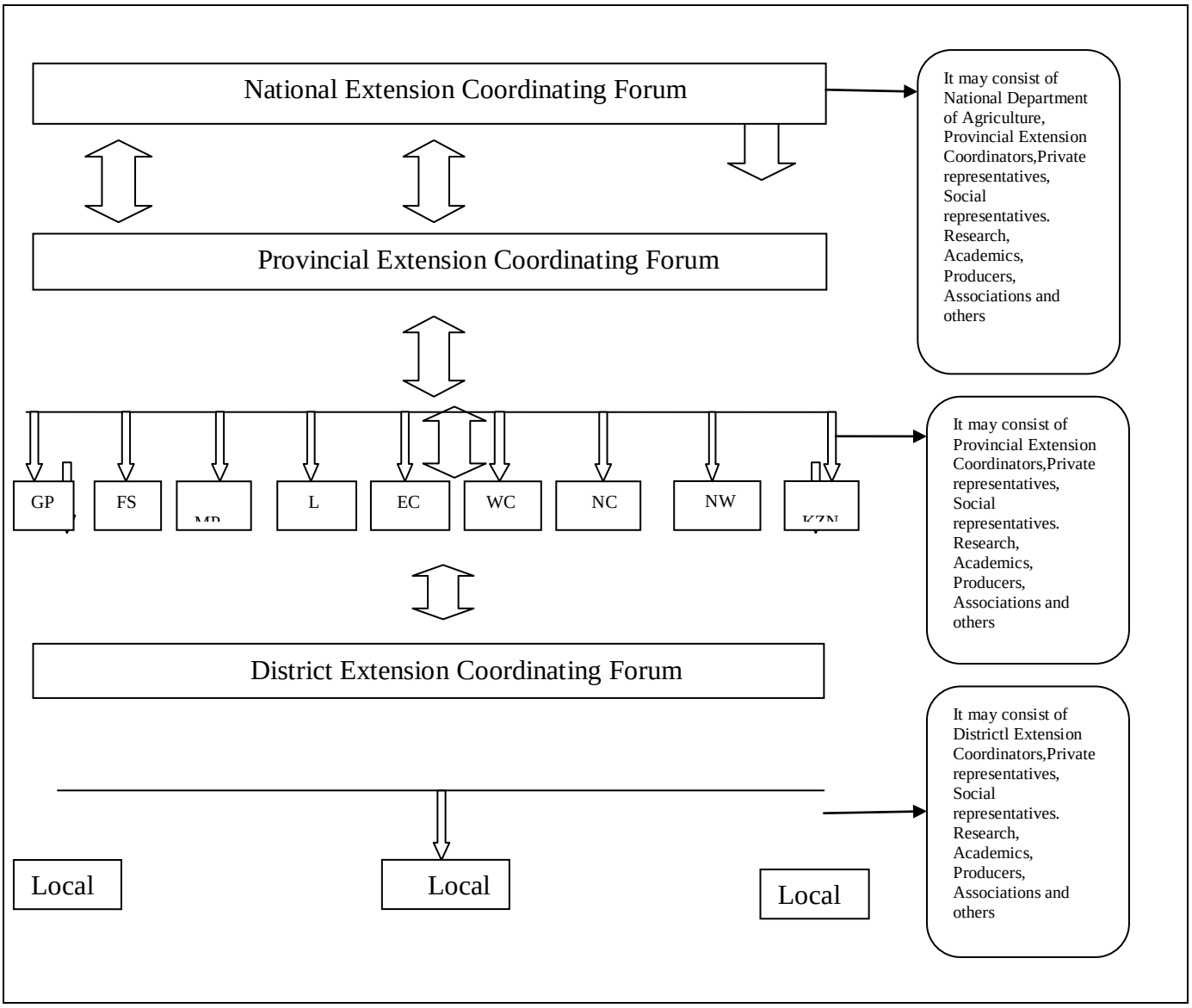

Figure 2: Institutionalization of extension coordination forum in South Africa

(Adapted from Draft National Policy on Extension and Advisory services DOA, 2014)

6.2 Extension Recovery Plan

The Extension Recovery Plan (ERP) was developed to capacitate or revitalise extension and advisory services in the country. This initiative sought to address various challenges and limitations in the sustainability of farmers and farming activities. The five strategic objectives or pillars of the ERP initiative are to: ensure visibility and accountability of extension; promote professionalism and improve the image of extension; recruit extension personnel; re-skill and re-orientate extension workers; provide information and communication technology (ICT) and other resources (DOA, 2011).

6.3 Norms and Standards for agricultural extension (NSAEAS)

Norms and Standards for South African Extension and Advisory Services were also developed as a result of lack of framework for these services (DOA, 2005). Among other objectives, the Norms and Standards promote participatory approaches to extension and advisory services that lead to sustainable income generation by extension's clients in the context of fostering learning on sustainable agricultural production, including the conservation of natural resources. The Norms and Standards specifically define sustainability with six factors: productivity; risk reduction; protection of the environment; economic viability; social acceptability; technical feasibility; and commercial feasibility (DOA, 2005).

Additionally, the Norms and Standards emphasise strengthening the link between research, extension and farmers to promote research that supports sustainable agriculture. Finally, the Norms and Standards also emphasise the need to revitalise curriculum at institutions of higher education. The curriculum should enable extension practitioners to address issues such as increasing food security, economic growth, globalisation and environmental conservation (DOA, 2005).

6.4 National Development Plan

The National Development Plan (NDP) is considered a major step in the process of charting a new path for the Republic of South Africa – including promoting agriculture as an important path to eliminate poverty, reduce inequalities and redress the imbalances caused by apartheid. It is anticipated that much agricultural land will be urbanised which potentially creating uncertainties regarding food production and food insecurity. The NDP encourages moving away from unsustainable use of natural resources – expressing the need to reduce carbon emissions, and the concern that water for agriculture and drinking is becoming scarce and exhorting famers to use water-conserving irrigation methods. [needs reference]

The NDP also addresses social protection in terms of improving livelihoods, pronouncing that eliminating poverty and reducing inequalities the main drivers of social solidarity. The NDP emphasizes that South Africa's agricultural potential is much larger that its current output; that the low potential is results from poor access to agricultural land and environmental degradation of land controlled by foreign and private entities. The NDP proposes a 'green revolution' to encourage food security by promoting sustainable agricultural among smallholder farmers.

7. FINDINGS AND IMPLICATIONS OF THE STUDY

The main objective of this study was to evaluate South African public agricultural extension and its alignment to the five pillars of sustainable agriculture. The premise of the study was that there is no inclusive policy dealing specifically with sustainable agricultural practices in South Africa (Khwidzhili & Worth, 2017). Thus, it was necessary to study various policies to determine the criteria being used when discussing or promoting sustainable agriculture. To facilitate this discussion, each of the five pillars is discussed.

7.1. Maintaining and increasing biological productivity

The NPEAS refers several times to improving productivity of agricultural production, with emphasis on the production of food. However, no reference is made to organic matter in the soil, which is a key factor in sustained productivity. The ERP developed to capacitate extension and advisory services, focuses on improving the role of extension and advisory services with reference to promoting sustainable agricultural practices. However, no reference made to biological productivity. The NSAEAS gives a framework for conducting extension, with specific reference to "improved agricultural productivity" (DOA, 2011:2) and includes it as part of sustainability (DOA, 2011:4), but with little elucidation about it except that it is function of innovation. The NDP emphasises the production of food to eliminate food insecurity by 2030.

7.2. Decreasing the level of risk to ensure larger security

This pillar is often confused with economic viability. While they are related, they are separate elements of sustainability. The NPEAS and the ERP both conflate risk and economic viability into the traditional economic viability pillar of sustainability; thus, losing the nuance of risk which is inherent in agricultural production and therefore cannot be totally eliminated. The ERP makes reference to risk in relation to agriculture, noting only that extension should (among other things) address "dealing with changing patterns of risk" and that risk reduction is part of sustainable production (DOA, 2011:1). The NDP broadly discusses risk across all development endeavours covered by the policy, and in particular lifestyle risks faced by individuals. Specifically, it refers to climate-change risk and the related risk of insufficient irrigation water. It raises concern regarding bio-security risk in the context of promoting export-quality production from smallholder farmers, but does not specifically speak to risk in agricultural development as an element of sustainability.

7.3. Protecting the quality of natural resources

This pillar is well-emphasised in all four policies. This is not unexpected as it originates from the three traditional pillars of sustainable agriculture. It is, however, always referred to environmental viability. It is noted that the policies, not dissimilar to literature on sustainable agriculture, integrate this pillar is integrated with biological productivity – masking the distinct role of biological productivity in sustainable agriculture. This is the case with the NPESA and the ERP which define this pillar in terms of environmental viability. The NSAEAS specifically refers to the objectives of "endowing farmers with skills and knowledge for ensuring sustainable resource management" (DOA, 2005: 2) and cites this as a specific function of extension.

The NDP refers specifically to the need to address the "extreme pressure on natural resources" – which resources it states, "include its adjacent oceans, soil, water, biodiversity, sunshine and a long coastline" (NDP, 2013:47). To achieve this, the intention is to establish an environmental framework that indicators for natural resources to be publicly monitored. As noted, the NDP makes specific reference "long-term planning to promote biodiversity and the conservation and rehabilitation of natural assets" (NDP, 2013). Specifically needing attention is "damage to the environment includes

soil loss due to erosion, loss of soil fertility, salination and other forms of degradation" and the harmful practices where "water extraction for irrigation is exceeding rates of replenishment" (NDP, 2013: 92.)

7.4. Ensuring agricultural production is economically viable

This is one of the three traditional pillars of sustainable agriculture. Thus, it would be reasonable to expect to find reference to it in each of the policies reviewed. However, this is not the case. The NPEAS refers to economic viability in the context that extension should foster economic "economic sustainability of the agriculture, forestry and fishery sectors" (DOA, 2013:4), and with specific reference to land reform. The NSAEAS indicates that extension "projects/activities must consider economic impacts" and includes "economic viability" (together with "commercial feasibility") as a part of its definition of sustainability (DOA, 2013:4). The ERP makes no mention of economically viable agricultural production. The NDP alludes to the need for land reform to result in economically viable agricultural production; otherwise it makes no reference to the economic viability of agriculture.

7.5. Ensuring agricultural production is socially acceptable

Again, given that social acceptability is one of the original pillars of sustainability, it should appear in each of the policies reviewed. Surprisingly, there is little reference to social acceptability in agriculture. The NPEAS notes that extension should lead to "wise decision- making about the socially…sustainable use of resources" in farmers' efforts to advance their livelihoods. It notes also that, in the pursuit of commercialisation, more attention must be given to social impacts of commercialisation. The NSAEAS indicates that extension "projects/activities must consider social impacts" and includes "social acceptability" as a part of its definition of sustainability (DOA, 2013:4). The ERP makes no reference to social acceptability in any context. The NDP considers social acceptability as fundamental to sustainable development. It refers to the need to produce food that is socially acceptable.

8. CONCLUSION

This paper provided a succinct evolution of agricultural extension in South Africa with special emphasis that extension services were imposed on farmers through the transfer of technology extension approaches. Since its inceptions in South Africa, agricultural extension is now recognised by the South African Council for Natural Science Profession (SACNASP). This implies that agricultural extension practitioners should register as scientists. The implication for this is that extension should work under code of conduct regulated by SACNASP. Drawing from the evidence presented in this paper it can therefore be argued that South African public agricultural extension is best placed to promote sustainable agriculture through the five pillars of sustainability. Apart from the conventional approaches there are a number of models the extension could use to disseminate information. The definition of agricultural extension was highlighted starting from the early years, beginning of second millennium and beyond. The paper highlighted the role of public extension services in South Africa.

The promotions of sustainable agricultural practices amongst farmers remain the domain of public extension in South Africa. Central to promotion of sustainable agricultural practices is the knowledge, skills and insight concerning the multifaceted process of changing farmers' behaviours. The national policy on extension and advisory services serves as a framework guiding the role of different stakeholders that are involved in public extension services. The extension and advisory

policy support the establishments of extension coordinating forums ranging from districts, provincial and national. These forums will be vital in promoting sustainable agricultural practices provided that all stakeholders remain relevant. Judging from its composition which ranges from researchers, academics, private sector, associations, social representatives and other, these forums could play a pivotal role in shaping the landscape of extension and advisory services in South Africa.

The paper also identified other initiatives by the government to support extension and advisory service. These initiatives include amongst others the extension recovery plan (ERP) and the norms and standards for extension and advisory services. The paper also confirmed that a four-year degree in agriculture is required in order to practice extension and advisory services in South Africa. The study also observed that in few years to come, no one will be allowed or appointed as an extension practitioner if they are not registered with SACNASP. Registration to SACNASP should be preceded by registering to the South African Society of Agricultural Extension. SASAE is the voluntary organisation which acts as a mouthpiece of advocating extension and advisory services in the country. Finally, the establishment of a national policy on sustainable agricultural practices would serve as a compliment for the national policy on extension and advisory services in South Africa.

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Back to Table of Contents

COMMERCIALISATION OF EMERGING FARMERS AND CONTRAINTS TOWARDS COMMERCIALISATION OF RURAL FARMERS IN THE EASTERN CAPE, MHLONTLO LOCAL MUNICIPALITY.

Mnguni, N.[73]

THIS PAPER WAS NOT AVAILABLE AT THE TIME THE PROCEEDINGS WAS PRODUCED.

Back to Table of Contents

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SIDE EVENT MONDAY 4 JUNE 2018.
1. ALL ABOUT PREPARING AND PRESENTING PAPERS.

Vorster, I.

A recent survey done on the use and importance of presentations in 2018 showed the following results:

- 92% agreed/ strongly agreed that presentation skills are critical to their work
- 79% agreed/ strongly agreed that most presentations are boring
- 91% agreed/ strongly agreed that they would feel more confident if they felt their presentations were beautifully designed
- 88% put in ‘quite a bit’ to ‘a huge amount’ of work into their presentations

These results show that presentation skills and development of presentations are seen as important within the working environment. Basic guidelines can, however, help make the process easier. This process becomes faster and easier with time, so expect to spend a lot more time in the beginning when you are developing your style and learning the basics.

The general outline for this guideline is:

- Call for papers
- Information retention
- Preparing a scientific or general paper
- Preparation differences for a new methodology/ technology
- Slide layout
- Tips and examples
- Presenting

The call for papers

The call for papers will take on a specific format. The SASAE call for 2018:

52ND CONFERENCE OF THE SOUTH AFRICAN SOCIETY FOR AGRICULTURAL EXTENSION

SASAE

FIRST ANNOUNCEMENT, CALL FOR PAPERS & REGISTRATION

"SYNERGISING AGRICULTURAL EXTENSION SERVICES TOWARDS THE COMMERCIALISATION OF SMALLHOLDER PRODUCERS"

Premier Hotel East London ICC, Marine Park Complex, 22 Esplanade, Beachfront, East London, Eastern Cape.
5 – 7 JUNE 2018

There are specific things you need to look at when receiving such a call:

1. Who is sending this out, who and at what level is your audience. We are looking here at a very specific conference call for Agricultural Extension, so your audience should have all the basic knowledge and higher, is it formal/ informal?
2. What is the theme? Do you have something to say in terms of this theme? If not, do they allow non-themed talks and what are their guidelines
3. Are you available on the dates of the conference? Compiling a programme is very time consuming, do not waste other people's time by sending in an abstract when you know you cannot attend.
4. Do you have the budget to attend? Especially if you have to travel, this can be an expensive exercise. Do you need to fly/ rent a vehicle/ how long must you stay over/ can you share / cost of meals/?
5. What can you find out about the venue? Will the facilities be well organised and have many amenities or can you expect a high light situation with only basic equipment?

Writing the abstract

Look for the information regarding the abstract. Below is an example from the SASAE call for proposals:

Individuals and organisations/institutions are hereby invited to prepare proposals of papers or posters on:

(a) Topics related to the central theme of the conference or any of the above related sub-themes.
(b) Any other extension related proposals or submissions that are not directly related to the conference theme, but are of potential interest and value to conference participants.

Research and philosophically based papers, as well as papers based on practical experience, will be considered. However, proposals related to the central conference theme will receive preference. All proposals will be peer reviewed and for this purpose the following is required: (If your proposal does not comply to this, it will not be accepted).

1. A summary of a minimum of 200 words, with clear reference to (a) Introduction (b) Purpose of the paper (c) Methods or data sources, (or reasoning used in theoretical/philosophical papers) (d) Results, (e) Conclusions and extension implications.
2. Separate title page with name(s) of author(s) and full contact information. E-mail address is especially important.
3. Submission by e-mail in Microsoft Word to the e-mail address below.
4. An indication whether the proposal is intended as a paper or as a poster presentation.

PROPOSALS ARE DUE NOT LATER THAN DECEMBER 15, 2017 and should be sent to, E-mail: of Dr. J A van Niekerk - vNiekerkJA@ufs.ac.za or Fax: 086 541 2166.

Take note of the following:

- Are only themed papers allowed?
- Are there specific guidelines for the abstract? What are they?
- What is the deadline for the abstract (subtract about 7 days to make sure you are on time should you have problems with your email).
- Where the abstract should be sent?

In this case the guidelines are quite clear. Develop your paper in the following manner:

- Title – make it clear, this is where you need to hook your audience. You must make them interested in your paper so they will come and listen to you
- Introduction – why is it important, you must grab the interest of your audience here or they will move to another paper
- Purpose of the paper – this is used by reviewers to decide if your paper contributes anything to the conference. Be clear about your objectives and tell them what contribution you will make
- Methodology – describe methods, data collection and analysis. Be concise but clear.
- Results – what are your most important findings
- Conclusion and extension implications – what are the implications of the results and the limitations of the study.

Let someone else who is not involved with your work, read it to determine clarity of your abstract.

Information retention

The combination of oral and visual is three times more effective than one technique alone
The impact of a message is determined by:

- 55% body language (be open

- 38% vocal quality (be passionate about your presentation, care and show it in your voice)
- 7% literal words
    - *It's not what you say but how you say it*

With the onset of internet and the fast access to data, social media and other applications, the attention span has shortened from twenty minutes to between three and five minutes. This has some severe implications on presentations. You need to work very hard to keep people focussed and listening.

Why is time important?
The best presentations are on time. Your message stays clear and focussed to the title and you are not talking too much. Being on time also shows respect for your audience (their time is also important) and your fellow presenter(s) in your session, allowing people to move between sessions without losing parts of presentations.

Preparing a scientific or general presentation

A presentation is a way of telling a story. How this story is told is very dependent on the individual. Understanding your style is very important as it leads to better presentation development and delivery. Have a look at other presentations: which ones do you enjoy most? What is it about those that you like? Is it something you would be comfortable with? Remember not everyone can tell a good joke. Look at styles of slides. What did you hate/ find distracting? Cut these ones out of you presentation – if you do not enjoy them, your presentation of them will definitely transfer this to your audience!

A presentation/paper tends to have some distinct components:

- Title: Clear, concise – you have to hook your audience here. Include your objective and scope in here. There should be enough information that everyone knows what your presentation encompasses. You want them to listen to you, not to the presenter in the other session.
- Abstract: this is only included in the paper you have to hand in for inclusion in the proceedings
- Outline: tell your audience what you are going to talk about and in what order. This ensures a well-structured and logical presentation development. If your time is very limited, consider taking this part out. This decision is very controversial, with the more traditional speakers frowning upon this practice.
- Introduction: You have a few seconds to hook your audience. What are your objectives for this work? What do you want to accomplish/ show/ prove? Link the Introduction to your Conclusions. Use your literature review to place your work in context. Make sure any literature cited is necessary.
- Materials and methods: When, where and how. Using pictures/graphics effectively here can help explain methodologies used. This is usually brief. If you are explaining a new method or technology, this becomes the most important part of your presentation and then this is detailed.
- Results: What did you find/ learn? Support this with statistics and facts. Use minimal text and tables; make more use of graphs/ other visuals. This is where you can impress with your results.
- Graphs should be in logical order and simple. Using 3D tends to complicate interpretation, as it is more difficult to read. Be careful with the colours you use, make sure they are very easy to differentiate. Only add what addresses the title, cut anything unrelated to the title.

- Conclusions and discussion: this is very personal and many prefer to split this into two headings while others prefer to combine this. Only discuss results supported by data. There should be a clear message here that is in line with the problem statement and title (the 'so what' of the presentation). Restate your purpose and main findings here. Discuss the implications that these answers have for extension personnel and/or farmers. Discuss any follow up you suggest here.
- References: if you have used any literature, make sure you place the references here. For SASAE use the format used by the Journal. Make sure you include all the references used, and every time you make changes, check for consistency.
- Acknowledgement: Thank the people and institutions that have made substantial contributions towards this project. These include co-authors, donors, facilitators, translators and people providing information (i.e. communities). Check with your peers if you are uncertain about anyone. If this is a dissertation, include your supervisor and check whom else to include.

Before you deliver your presentation, ask someone not from this field to listen to you and ask questions. Make sure you have done a spell check.

Preparation differences for a new methodology/ technology

The main difference between this kind of presentation and one presenting results, is that the Materials and methods will become the main body of your presentation. When, where and how. Using pictures/graphics effectively here can help explain methodologies used, and they should be detailed. Address the other aspects in the same way as in the results oriented presentation, but their importance is far less.

The most important thing to discuss with a new technology/ methodology is what is in it for them. If they use this, what improves/ is easier/ faster/ more accurate/ cheaper, etc. What opportunity does this open up for them? You are a sales person here, if you do not provide such an answer there is no motivation to try something different.

When you speak about the current situation, do not attack it and try to tear it to pieces. Go about things logically and illustrate how this could have a positive impact. As soon as you start attacking a situation, many people who are comfortable in that situation will stop listening and try to look for things on which they can tear you down. Change is slow, rather try to create a willingness to listen than a dead stop due to an aggressive approach.

Talk about the ideal situation. How to reach this ideal and how your method/ technology will help movement towards this ideal. Show what you think the benefits are to using your solution.

Think about any possible objections that could be raised and address these in your presentation. Support your suggestions with statistics/ proof/ examples and facts. Building a strong foundation on which this rests minimizes any objections. It shows a well thought through, logical presentation where all the aspects were addressed. People will be more willing to talk about this as a possible solution if you identified and discussed their objections within the presentation.

In the Conclusion, summarize the key points: opportunity, solution, benefit. Include the actions needed: what, where, how in what timeframe.

Slide layout

Slide layout is very personal, understand what you like and build on that. Layout also evolves over time as your confidence and knowledge increases.

- Must you use the work template or are you free to create your own design? Make sure you use the work's template where needed, there is nothing worse than being admonished for not using the correct template.

- Check with your peers what logos must be included where in the presentation. It might be that your employer's logo must be on each or most slides, but that of a donor just on the first and/or acknowledgement slide(s).
- The message on each slide must be clear and not lost between the artwork you decide on
- Many times simple designs are the most effective
- One slide = 1 idea. Use maximum 7 lines per slide
- If you use sentences, the audience reads and does not listen
- Text
    - Use keywords and people will sit back and listen
    - Horizontal text is easier to read than vertical text
    - Use sentence case in your poster. CAPS is against the principles of speed reading and people easily move away from such a poster as it slows their reading and 'wastes my time'
    - Font size a minimum of 24 or the people at the back will not be able to see
    - Make sure your background does not detract from your text. Text must be easily legible
    - Use easily legible fonts
        - THIS IS HORRIBLE
        - ***This is great***
- Words vs graphs/pictures. One picture is worth a thousand words
- Visuals must mean something
    - If you scan in a photo, scan at least 300dpi or it will be grainy
- Ensure that your background is not so busy that it distracts the reader. Especially backgrounds with strong textures/ colours are risky

If your workplace requires that any publication first has to go through a publication evaluation before you can continue, you must build in ample time for this. If they give feedback within three weeks, add another week for safety. Remember to start checking on progress halfway through the timespan required by your work. The closer it comes to deadline, the more regularly you should check. Check that they have received your submission within two days of handing in. Do this per email and telephonically – keep a paper trail!

Tips and examples when preparing presentations

Using humour to illustrate a point can be very successful. Cartoons are very universal.
If you want to try a short video, develop two presentations: one with and one without the video. When you get there, test the video on the laptop you will be using and make your decision on which presentation to use there, based on if the technology's capacity. Do the same when you want to use animation. Different software versions can lead to animations going haywire during a presentation. Be careful of words that have multiple meanings. Make sure the meaning is clear within the context used. We use the word 'Extension' for transfer of technology, nails, hair, ladders, electrical cord, tents and exercise, to name a few.

Presentations and colour:
Be careful of the colours you use for text on coloured backgrounds, especially if you use photographs. You might have to block the text and make the background light to enable easy reading.

Difficult	Easier

Use 2-3 primary colours and stay consistent. Too many colours can make the poster look too busy.

Remember that some people are colour blind. Keep this in mind when you present your results in graphs. Think about possibly using colour and texture together to present results. Thicker and thinner lines, dashes and solid lines together with different colours make your results more 'colour-blind proof'. The majority colour-blind people cannot distinguish between red and green. Keep this in mind.

How to approach high light venues
Community halls, schools, churches often have problems with too much light when you want to present something. There are a few guidelines you can use to try and optimise presentations at these venues.

- Choose the darkest spot possible for the screen
- Use black text on a white background, this is the most legible in these conditions
- Use simple, high contrast colours in drawings. Photos tend to be very difficult to see

The more light you can block, the more colours you can use in your presentation

Ineffective presentations

The most occurring aspects of ineffective presentations are:

! Unclear objectives
! Unclear main points
! Confusing layout
! Poor graphics
! Small, **unclear** text

Addressing these aspects will go far to ensure a successful presentation.

The presentation session

Getting your presentation there safely:
Ask a colleague/ friend not travelling with you to take a copy of the presentation with them and have one available on a USB that you keep on your person. Should something happen you will have a backup available.

Before the presentation:

- Ask where and when to load the presentation – keep to it
- Make sure you know where you will be giving your presentation, familiarise yourself with the venue

- Write out the information needed by the chairperson to introduce you on a piece of paper/ type it. Ensure your name is very clear. You can also add the reference to the presentation, it makes it easy for the chairperson to connect you to the presentation
- Introduce yourself to the chairperson before the session begins. Be there early. Make sure your presentation works (also any animation/ video). You can usually load your presentation in the break before the session. Find out if you can load it early in the morning and test it while people are still enjoying their refreshments outside.

The presentation session:

- Are you dressed appropriately? This is an official meeting; your presentation is the attraction, not you. Wear something neat and tidy that fits in with the dress code of the meeting. Now is not the time to be adventurous with your dress code
- Be on time
- Don't read your presentation, you should know it by heart (helps address fear of presenting)
- Keep eye contact with your audience (look from side to side, front to back in a controlled manner)
- Keep an open stance (don't fold your arms) and do not become aggressive
- Have deliberate movements, don't wave your arms about
- Stand comfortably
- Keep the speed of your speech under control. Nervousness is normal and tends to speed up your talking speed. If you are still unsure about presentations, ask a friend to give you clues if you are talking too fast/ slow or developing a distracting behaviour. Immediate feedback while you are talking will help correct you and give you more confidence.
- Always make sure you answer questions. Have a paper and pen with you. Write the questions down. Thank the person for the question and check to hear if you heard the question correctly. Answer it, and then ask if you have answered it.

Build your confidence by practicing your speech. As you get used to presenting, you will find that you need less time to practice. If you know your subject matter very well, this also boosts confidence. Practice, practice, practice!

After the conference

Make contact with any people you promised to give some more information or feedback to. This is how you start building networks and your reputation.

Add the paper to your CV! Use the format of the journal you want to publish in most, it saves time and keeps the format consistent throughout your CV

Back to Table of Contents

2. ALL ABOUT PREPARING AND PRESENTING POSTERS.

Vorster, I.

The general outline for the guideline is:

- Why do you want to present a poster?
- Call for posters
- Writing the abstract
- Developing a poster
- Tips and examples
- Ineffective posters
- Poster session

Why do you want to present a poster?

There are mainly four reasons most people want to present a poster:

1. When you are at the start/end of a project. This is an ideal platform to test your methodology and/ or views with your peers. If used effectively you can streamline your planned area of study or finalise your views on what happened in your study. Choose a specific area that might be troublesome and prepare a poster on that to help you crystalize your ideas.
2. When you have done a case study you feel might be of value to others. Share your lessons learnt, a valuable training tool!
3. If you did not get a spot for your paper, you might get a spot for a poster. Think about this, can you identify an idea that you can develop a poster from? A common mistake made is that the whole or most of the information of the paper is condensed into a poster. This tendency leads to ineffective posters.
4. If you are not confident enough to present your work as a paper. This is a good method to start developing your presentation skills and is usually the first step towards presenting your work to your peers. This is also a good platform to use if the language you need to present in is not your home language.

The call for posters

The call for posters will take on a specific format. The SASAE call looked as follows:

52ND CONFERENCE OF THE SOUTH AFRICAN SOCIETY FOR AGRICULTURAL EXTENSION

SASAE

FIRST ANNOUNCEMENT, CALL FOR PAPERS & REGISTRATION

"SYNERGISING AGRICULTURAL EXTENSION SERVICES TOWARDS THE COMMERCIALISATION OF SMALLHOLDER PRODUCERS"

Premier Hotel East London ICC, Marine Park Complex, 22 Esplanade, Beachfront, East London, Eastern Cape.
5 – 7 JUNE 2018

There are specific things you need to look at when receiving such a call:

6. Who is sending this out, who and at what level is your audience. We are looking here at a very specific conference call for Agricultural Extension, so your audience should have all the basic knowledge and higher
7. What is the theme? Do you have something to say in terms of this theme? If not, do they allow non-themed talks and what are their guidelines
8. Are you available on the dates of the conference? Compiling a programme is very time consuming, do not waste other people's time by sending in an abstract when you know you cannot attend.
9. Do you have the budget to attend? Especially if you have to travel, this can be an expensive exercise. Do you need to fly/ rent a vehicle/ how long must you stay over/ can you share / cost of meals/
10. What are the cost of poster presentation? Where are you printing/ mounting/ encapsulating? Are you designing it yourself or must you pay a graphic designer? Always check to see if you must also prepare a talk of a few minutes.

Writing the abstract

Look for the information regarding the abstract. Below is an example from the SASAE call for proposals:

Individuals and organisations/institutions are hereby invited to prepare proposals of papers or posters on:

(a) Topics related to the central theme of the conference or any of the above related sub-themes.
(b) Any other extension related proposals or submissions that are not directly related to the conference theme, but are of potential interest and value to conference participants.

Research and philosophically based papers, as well as papers based on practical experience, will be considered. However, proposals related to the central conference theme will receive preference. All proposals will be peer reviewed and for this purpose the following is required: (If your proposal does not comply to this, it will not be accepted).

1. A summary of a minimum of 200 words, with clear reference to (a) Introduction (b) Purpose of the paper (c) Methods or data sources, (or reasoning used in theoretical/philosophical papers) (d) Results, (e) Conclusions and extension implications.
2. Separate title page with name(s) of author(s) and full contact information. E-mail address is especially important.
3. Submission by e-mail in Microsoft Word to the e-mail address below.
4. An indication whether the proposal is intended as a paper or as a poster presentation.

PROPOSALS ARE DUE NOT LATER THAN DECEMBER 15, 2017 and should be sent to, E-mail: of Dr. J A van Niekerk - vNiekerkJA@ufs.ac.za or Fax: 086 541 2166.

Take note of the following:

- Are only themed posters allowed?
- Are there specific guidelines for the abstract? What are they?
- What is the deadline for the abstract (subtract about 7 days to make sure you are on time should you have problems with your email).
- Where the abstract should be sent?

In this case the guidelines are quite clear. Develop your poster in the following manner:

- Title – make it clear, this is where you need to hook your audience. You must make them interested in your poster so they will come and read it
- Introduction – why is it important, you must grab the interest of your audience here or they will move to another poster
- Purpose of the poster – this is used by reviewers to decide if your poster contributes anything to the conference. Be clear about your objectives and tell them what contribution you will make
- Methodology – describe methods, data collection and analysis. Be concise but clear.
- Results – what are your most important findings
- Conclusion and extension implications – what are the implications of the results and the limitations of the study.

Let someone else who is not involved with your work, read it to determine clarity of your abstract.

Developing posters

Once your poster is accepted, you have to draw up a timeline for yourself. Below is a guideline of how to make one, but change it according to your circumstances. To develop a timeline, start week 0 as the week in which you have the conference, then work back. Check time allowances with any service providers. Check availability of people you want to use as reviewers, as well as that of your co-authors.

An example of a timeline for the development of a poster:

Week	Activity
0	Poster presentation
-1	Print and encapsulate (check to make sure if time allowed is enough)
-2	Make final changes Check with co-authors Prepare final version
-3	Make changes suggested by peers Send back to peers for second time
-4	Send to peers for first time
-5	Make changes recommended
-6	Edit ruthlessly Send to co-authors
-7	Define message Plan and design poster Prepare draft

If your workplace requires that any publication first has to go through a publication evaluation before you can continue, you must build in ample time for this. If they give feedback within three weeks, add another week for safety. Remember to start checking on progress halfway through the timespan required by your work. The closer it comes to deadline, the more regularly you should check. Check that they have received your submission within two days of handing in. Do this per email and telephonically – keep a paper trail!

When developing a poster, keep the following in mind:

- Clear title – this is where you grab your audience's attention
- Focussed message – tell a story by having the essence of the poster in one line
- Use 5000 – 10000 words, it allows reading time of 5-10 minutes. People have a short time to read, if your poster is full of information and long they will pass it by and read others first
- Stick to the size the meeting has given

Evaluation of posters generally look at the effectiveness of the following: Introduction, objectives, materials and methods, discussion, how this work influences extension and the general appearance. Keep this in mind when designing your poster.

A poster tends to have some distinct components:

- Title: Clear, concise – you have to hook your audience here
- Abstract: if not specified, do not put it in. It takes away space from what you want to say
- Introduction: You have 11 seconds to hook your audience. The first 2-3 sentences will make them decide to read or move on. State the problem and why the answer you have is important. What are your objectives for this work? Link the Introduction to your Conclusions. If you are doing a slight literature review here, use it to place your work in context.
- Materials and methods: When, where and how. Using pictures/graphics effectively here can help explain methodologies used. This is usually brief. If you are explaining a new method or technology, this becomes the most important part of your poster and must be detailed.

- Results: What did you find/ learn? Support this with statistics and facts. Use minimal text and tables; make more use of graphs/ other visuals. This is where you can impress with your results. Figures must be able to stand alone (title of graph should be clear and based on that you must be able to understand the graph).
- Graphs should be in logical order and simple. Using 3D tends to complicate interpretation, as it is more difficult to read. Be careful with the colours you use, make sure they are very easy to differentiate. The implications/ interpretation of the graph should be close to the graph (above or below) to allow easy reading. Only add what addresses the title, cut anything unrelated to the title.
- Conclusions and discussion: this is very personal and many prefer to split this into two headings while others prefer to combine this. Only discuss results supported by data. There should be a clear message her that is in line with the problem statement and title. Discuss the implications of these answers have for extension personnel and/or farmers. Discuss any follow up you suggest here.
- References: if you have used any literature, make sure you place the references here. These should be minimal (this is not a paper) and support the objective. For SASAE use the format used by the Journal. Make sure you include all the references used, and every time you make changes, check for consistency.
- Acknowledgement: Thank the people and institutions that have made substantial contributions towards this project. Check with your peers if you are uncertain about anyone

Before you print, ask someone not from this field to read and check everything after you have done a spell check.

Tips and examples when preparing posters

Tip
Google the words 'poster scientific' or similar and have a look at what people have done. Look at what you like and what is similar between the posters that you like. This is a way to determine what you like and can use for your own design. This is especially useful if you have not determined your own style yet

Elements of a well-designed poster include

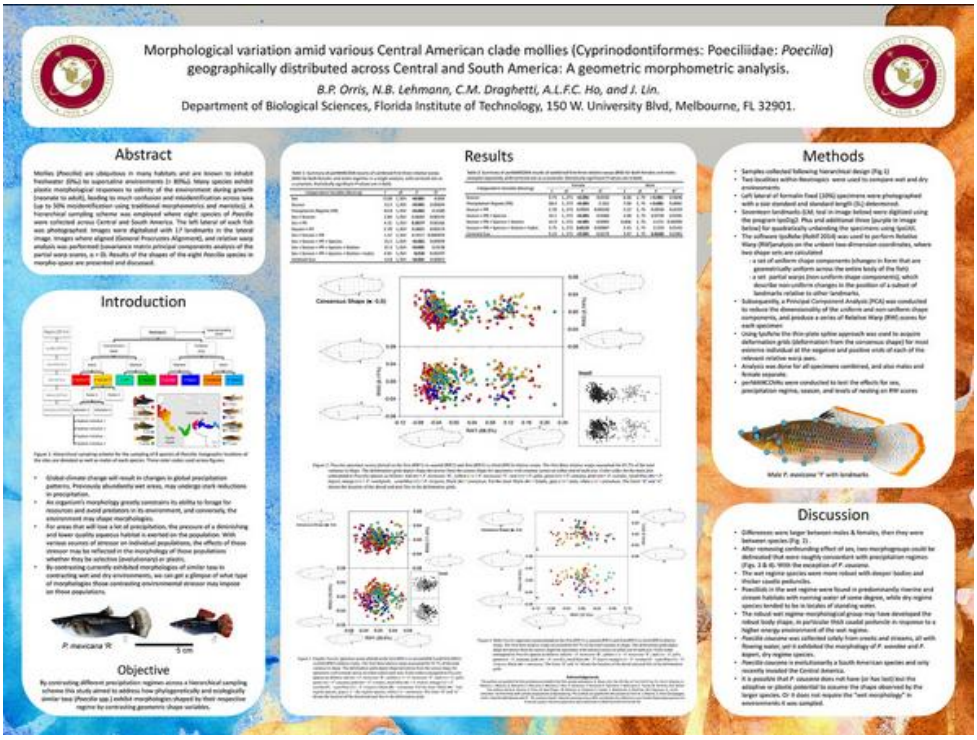
- ✓ Brief, clear wording
- ✓ Large lettering, short text blocks
- ✓ Fonts size guidelines
  - Title: maximum 2 lines, 72 points font size. Place the authors and affiliations beneath the title. Using a different type of font (like italics) make them easier to find
  - Headings 40 points
  - Body text 24 points
- ✓ Tables can be difficult to read, minimize their use
- ✓ Bright colours attract attention, too much just looks busy
- ✓ Words vs graphs/pictures. One picture is worth a thousand words
- ✓ White space vs cramped text. White spaces attract readers, posters with many words might lead to your poster being left till last (if read at all)
- ✓ Must be legible 1.5m away (the distance many stand to read during a poster session
- ✓ Make your poster attractive so it will hook your audience from about 5m away
- ✓ Horizontal text is easier to read than vertical
- ✓ Use sentence case in your poster. CAPS is against the principles of speed reading and people easily move away from such a poster as it slows their reading and 'wastes my time'
- ✓ Use easily legible fonts
  - THIS IS HORRIBLE
  - ***This is great***
- ✓ Visuals must mean something
  - If you scan in a photo, scan at least 200dpi or it will be grainy
- ✓ Ensure that your background is not so busy that it distracts the reader. Especially backgrounds with strong textures are risky

Posters and colour:

Be careful of the colours you use for text on coloured backgrounds, especially if you use photographs. You might have to block the text and make the background light to enable easy reading.

Difficult	Easier

Use 2-3 primary colours and stay consistent. Too many colours can make the poster look too busy. Some examples:



Look at the effective use of colour, white spaces and blocking to help organise the poster and present a balanced view.

The layout is logical and the colours kept minimal to ensure that the poster does not become too busy. Only a few bright colours are used and their use is consistent.

Ineffective posters

The most occurring aspects of ineffective posters are:

- ! Unclear objectives
- ! Unclear main points

! Confusing layout
! Poor graphics
! Small, **unclear** text

Addressing these aspects will go far to ensure a successful poster

The poster session

Getting your poster there safely:

If you have to travel, you have to get the poster there in mint condition. If you have to travel, buy/ make a container that will accommodate the whole poster without squeezing. You have invested a lot of time and resources into this so do not undo this in a few hours. If you fly, make sure you take this as hand baggage and ensure you keep this with you the whole time. Many a conference has seen open spaces due to lost posters.

Getting your poster up at the venue:

- Ask where and when to mount the poster
- How must they be mounted (you can ask from the organiser before the conference as you might have to take some Prestik/ Velcro along to attach the poster
- Make sure you attach the poster square and neat
- If you have handouts, attach the below or beside the poster or place them at the foot of the poster. Restock regularly.
- If your poster consists of more than one piece, make sure you have marked them on the back so you know how to attach them. There is not always space to pack them out in peace to determine this as space might be limited and many people will be busy with their posters.

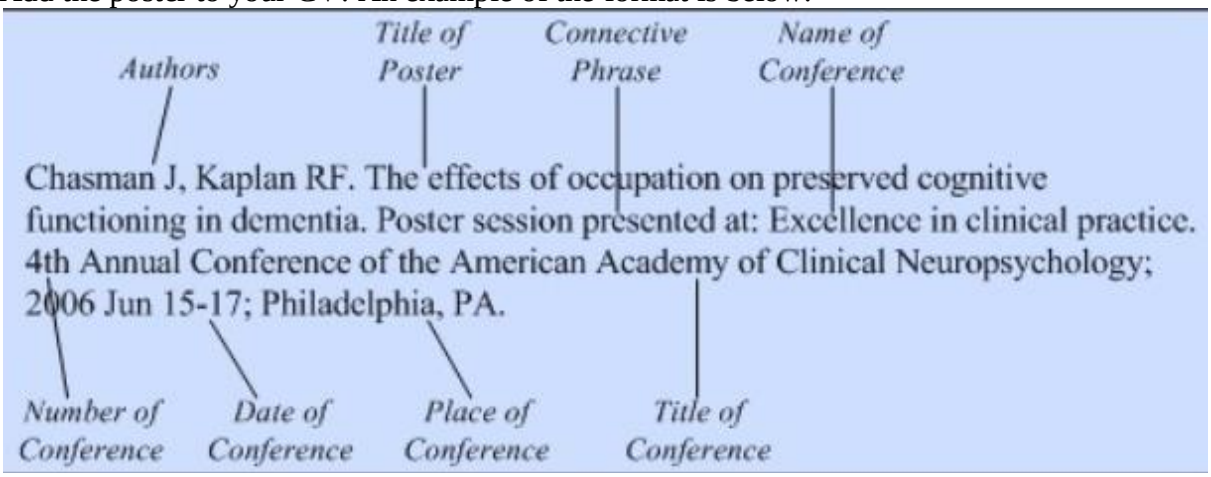
The presentation session:

- Are you dressed appropriately? This is an official meeting; your poster is the attraction, not you. Wear something neat and tidy that fits in with the dress code of the meeting
- Be on time
- Don't read your poster, you should know it by heart
- Prepare a half-minute, two-minute and five-minute talk. Determine what your audience wants to know and deliver that information. Always make sure you answer all questions
- Keep eye contact with your audience
- Keep an open stance (don't fold your arms) and do not become aggressive
- If you see people are passing by, ask a friend to stand and listen. One person listening tends to attract other listeners
- Allow people to read, assure you are there for any questions
- Make sure your contact details are clearly visible (suggest they take a photo if you do not have a card)

After the conference

Make contact with any people you promised to give some more information or feedback to

Add the poster to your CV! An example of the format is below:



Back to Table of Contents

POSTER SESSION.

The Best Poster of the SASAE Conference 2018 is displayed as a separate PDF File on the "Proceedings of Conference 2018" webpage. We could not have it in the Proceedings document.

Back to Table of Contents