THE ROLE OF THE PROFESSIONAL
EXTENSIONIST IN SUSTAINABLE AGRICULTURAL
DEVELOPMENT. "THE CHALLENGE TO CHANGE"

PROCEEDINGS OF THE 48TH CONFERENCE
SOUTH AFRICAN SOCIETY FOR AGRICULTURAL
EXTENSION

10 JUNE – 12 JUNE, 2014
TRAMONTO, GEORGE,
WESTERN CAPE PROVINCE.

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VERANDERING"

HANDELINGE VAN DIE 48STE KONFERENSIE
SUID - AFRIKAANSE VERENIGING VIR
LANDBOUVOORLIGTING

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TRAMONTO, GEORGE,
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FOREWORD

It has become customary to have the conference proceedings available – now no longer in a bound booklet but on CD-Rom. This year due to the great number of invited speakers on the first day of the Conference, the CD is available only after the Conference to ensure that all the presentations are included. The CD also includes presentations of the previous year’s SASAE Conference, namely 2013.

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included in these proceedings have only been adapted, where necessary, for print and appearance conformity, but have not been peer reviewed and are thus the sole responsibility of the authors.

SASAE Publication Committee

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 2013 – 2014 the Awards Committee proposed the following Awards to Members, which the Board approved:

1. AWARD CEREMONY 12 JUNE 2014

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

1.1 Tim Bembridge Extension Management Award (Bronze)

The recipient of this award has made substantial management contributions to Extension on a continuous basis. This year the Award went to Mr. P S Mentani of the Western Cape Province.

1.2 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 Ms. V Erasmus of the Western Cape Province.

1.3 Certificate for Coordinated Extension

The Certificate may be awarded to a group of Extensionists who, as a team, have launched a successful Extension programme. This year the award went to Ms. V. A. Madide and her team of the Mpumalanga Province.

1.4 Loubie Loubser Floating Trophy

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

1.5 The Transvaal Branch Floating Trophy

The recipient of this award has informed fellow Extensionists of successful Extension Actions. This year the Award went to Mr. H. J. F. Grobler of the Western Cape Province.
2. POPULAR 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 which one was the “Most Popular”.

This year the winner was Mr. M Nongingi of the Eastern Cape Province, for the paper: “Impact of the Ram Exchange Programme on wool production in Mqanduli”.

During the Conference we had a Poster Session where a number of posters were displayed. There were a panel that adjudicated the posters to determine the “Best Poster”.

The winner was Ms. N. H. Shezi from the KwaZulu Natal Province. The title of her Poster was: “Effect of soil acidity on nutritional quality (protein and oil) of Groundnut (Arachis Hypogea, L) seeds”.

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SCRIPTURES AND PRAYER.

Reverend Beyers.

Scripture John 15 verse 1-4

1. “I am the true vine, and my Father is the vinedresser. 2. Every branch in me that does not bear fruit he takes away, and every branch that does bear fruit he prunes, that it may bear more fruit. 3. Already you are clean because of the word that I have spoken to you. 4. Abide in me, and I in you. As the branch cannot bear fruit by itself, unless it abides in the vine, neither can you, unless you abide in me. Jn 15: 1-4 Bible, ESV.

Well known passage but very applicable to the agricultural world of today. God the Father is the gardener and takes care of His garden by pruning. Jesus Christ is the Vine and we must stay connected to Him. We are the branches and we must stay connected to Him at all times and at all costs. If we do not stay connected we will die. We can only produce fruit if we stay connected to Him. Therefore it is so important that in all we do, that we put our connection to Christ first

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WELCOME ADDRESS.

Bornman, M. E¹

- Honorable MEC
- Hon Executive Mayor of Eden District
- HOD
- Dr. Thornton
- Dr. Vink
- The Media
- And dear Extensionists

Welcome to the 48th Annual Conference of the South African Society for Agricultural Extension. The theme for the Conference of 2014 is: “The role of the Professional Extensionist in Sustainable Agricultural Development. – “A challenge to change”. During the next few days attention will be given to Professionalism, Challenges facing Practitioners, Land Reform, Climate Change, Extension Program Planning and Implementation and Education & Training.

At SASAE we feel very strongly about the education / training of Extensionists and recognition of Extension as a Science. Therefore there will be a session later today where various institutions of higher learning will present to you, what they offer in the field of Extension.

I will come back to professional registration a bit later.

Dr. Thornton of Argentina will tell us what is new and happening in Argentina. It is important that we as Extensionists take note of what is happening throughout the globe. We must learn from others experience and see how it can be adapted to our local circumstances.

Dr. Vink will give an economic overview on the status of agriculture in South Africa and refer to Agriculture’s role in the National Development Plan as well.

For years, the past 7 years to be exact, we have been talking about the acknowledgement of Extension as a science and a field of practice. I would like to thank Dr. Becker of SACNASP, Dr Koch and Dr Terblanché of SASAE and Mr. Lukhalo of DAFF for the work they have done! It gives me great pleasure to announce that the Minister of Science and Technology has approved Extension as a field of practice and it was duly gazetted in the Government Gazette of 24 January 2014. You present here are people who are given the opportunity to make history to be some of the first people ever to register as Extensionists with SACNASP. SACNASP is here to help you. They have set up shop here at Tramonto, for the next two days. Thank you to Dr Bakker and his team who are willing to assist in this regard. Please make use of this opportunity, visit them and get registered.

¹ President of SASAE. BornmanM@agric.limpopo.gov.za
Each one of you has received a light, during registration! This is both functional and symbolic. The bottle is having a little solar panel on the lid, that are charged by sunlight and at night it gives you light.

You can use your knowledge and talents and go out to the world and let your light shine. You can make a difference in the lives of the people you serve and interact with on a daily basis. Or you can never come in the “sun” to be charged and never make a difference. I believe you would not have become an Extensionist if you did not want to share your light with the world.

During the coming days you will have the opportunity to listen to people sharing their research and experience with you. They have worked very hard on their presentations to bring you the best product. As professionals let us respect them and give them the attention they need. Therefore you are requested to switch off your cell phones, laptops IPads and other electronic gadgets.

Use this opportunity to learn from each other.

Enjoy the conference

I Thank you

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WELCOME TO GEORGE.

Hon. Councillor, Executive Mayor Alderman Charles Stander

The welcome address from Executive Mayor Alderman Charles Stander was not available by the time the proceedings were collated.
OPENING OF THE 48TH CONFERENCE OF SASAE.

Isaacs, Joyene.²

A big thank you to the SASAE Board for choosing the Western Cape to host this year’s Conference.

SASAE has a long history; it is good to nurture history. People tend to throw out the baby with the bathwater. It is important that our young people protect this organisation and keep it strong.

There are five points that I want to highlight today:

1. Governance is important
   This is true from a governmental extension and sustainable development as well as a change perspective.
   If you do not keep record, if you don’t follow up, if you don’t follow codes it helps nothing. We need to understand where we fit into the bigger schemes of things.
   I worked as an extension officer, researcher, and many other positions. In any position it is important to see the bigger picture.
   No person is an island. You need to understand where you fit in. Beware of becoming isolationists instead of part of network. Officials and professionals should know how they and their responsibilities fit into the Bill of Rights.
   Extension officers are an important cog in the wheel of government. At parliamentary level our “bad” are often exposed, and the good not seen. We are measured on both compliance and service delivery. We take accountability and responsibility as a team.

² HOD, Department of Agriculture, Western Cape Province, South Africa. Email: joyenei@elsenburg.com
2. Communication

When we are communicating we need to be aware of what we say with our bodies and mouth. It is not just about talking. There are a couple of rules that need to be kept in mind:

- respect;
- space to listen well;
- when my staff writes something, I afford them the respect to read what they write. Whatever the language of communication, check your grammar… it shows respect;
- titles: respect earned by who you are, not by your title. We need to be alert by how we use communication to reflect our professionalism. Just by using a person’s first name will not make me relaxed when it comes to the quality of your work;
- how you communicate with clients.

3. Relations between a client and service provider

Service delivery to clients: it is our job to have the latest and best information. In reports from clients, the relations and perceptions of clients are sometimes seen as very negative.

How is our relation with information generators, i.e. with researchers, with academics? The relations with both industry and academics are important to harness information needed to serve your clients.

4. Professionalism

When it is raining and you visit a farmer, do not wear a suite. When someone visits me I look at how they are dressed. Look respectable, first impressions count.

Clients will judge you, especially if you are a woman: women are judged even more in rural communities. How do you present yourself, how do you carry that information? Say if you don’t now, “I will come back to you”. Commit to time to come back and give right information. The whole delivery package shows that I am professional. Last but not least: Register with SACNASP!
5. Change

Change is the only constant that there is. Global powers are shifting, agriculture becomes more expensive. But there are a couple of things within change that is consistent: people will always need food. We are part of system that produces food. We should attempt to make agriculture sexy. Young people must think it is the sexiest profession ever!

Thank you

(Notes taken by F Marais - Structured Agricultural Training. Department of Agriculture, Western Cape. Email: francoism@elsenburg.com).
KEYNOTE ADDRESS: THE ROLE OF THE PROFESSIONAL EXTENSIONIST IN SUSTAINABLE AGRICULTURAL DEVELOPMENT.

Thornton, R.³

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³ Regional Director La Pampa-San Luis, National Institute of Agricultural Technology, Argentina. thornton.ricardo@inta.gob.ar
AGRICULTURAL FUTURES: THE NEXT 30 YEARS?

Vink, N. ⁴

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⁴ Department of Agricultural Economics, University of Stellenbosch. E-mail: nv@sun.ac.za

Paulse, K.

Ek is gebore in die Kouebokkeveld, Ceres distrik as een van 6 seuns en 4 dogters. My ouers was doodgewone plaaswerkers en het hul leefyd vir die Du Toit groep gewerk. Ek het skool gegaan by die plaaslike laerskool en verder op Ceres tot en met Standerd 9. Omdat ons n groot gesin was moes ek skool verlaat om te gaan werk, om sodoende die res ook n kans op opleiding te gun. Begin werk as n gewone werker ook by die Du Toit groep en vorder tot spanleier na 10 jaar het ek verhuis na Citrusdal waar ek vir Mouton Citrus begin werk het. Met harde werk en baie kursusse het ek bestuurder van `n plaas geword. Die groep het geweldig uitgebrei sodat daar vandag 12 plase aan die maatskappy behoort.

Behalwe my eie plaas wat ek bestuur, is ek ook ontwikkellingsbestuurder. Ek is n besproeiingspesialis en verantwoordelik vir alle nuwe ontwikkellings. In my vrye tyd is ek ook betrokke by plaaswerker ontwikkeling op n geestelike manier. In 2013 is ek ingeskryf vir die plaaswerkerkompetisie wat ek dan ook eers die streek en toe die Weskaap gewen het. Huidiglik het ek by verskeie geleentheede plaaswerkers toegespreek oor landbou aangeleenthede. Ek werk steeds nog vir dieselfde maatskappy.

Om suksesvol vandag te kan boer is jou werkers jou belangrikste bate. In die lig van al die stakings en wat daarmee gepaard gaan was my beroep dat werkgewers en werknemers moet fokus op goeie verhoudinge. Kommunikeer oop en eerlik, behandel mekaar met respek. Belangrik dat werkgewers hul werkers se kultuur en agtergrond verstaan.

Dit is belangrik dat beide partye op die positiewe moet fokus, bring dit wat verkeerd is in aanmerking, maar ons moet leer om mekaar te vertrou. Die Staat moet ook in die boot klim om landbou n sukses te maak. Hersien weer subsidies op plaaswerkerbehuisings, elekrisiteit en dies meer. Munisipaliteite maak huidiglik nie voorsiening vir afgetrede plaaswerkers nie. Die Staat moet die verkryging van grond vir kleinboere wat suksesvol kan boer meer toeganklik maak.

Dit help nie om plase toe te ken en finansiering te voorsien aan plaaswerkers wat nie die passie en kennis het om suksesvol te boer nie. Die proses moet meer deeglik ondersoek word.

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FEMALE ENTREPRENEUR.

Jappie, W.

I am Wadea Jappie and I farm in Philippi. We bought the property in early 2002 merely to move out of the gang invested area we lived in. As we had 5 sons that needed space to utilise their energies we thought a small holding would be ideal. The land we bought was used as an illegal dumping site. So there was quite a lot of building rubble on the land.

I started out with just 20 layers so I can supply myself with farm fresh eggs. Also to live the farm life with chickens running around in the yard. Not realising a chicken lays an egg every day. So soon I had surplus eggs which I sold to my family who loved the idea of farm fresh eggs. Soon word got out amongst extended family and friends and I increased my capacity to 100 layers and supplied local a coffee shop and the home cooking industries which is very common in our Malay communities. When I knocked on the Department of Agriculture of Western Cape door, Wilton September was assigned to our project, he had very little knowledge regarding layers as he is a vegetable Extension Officer. But he researched and assisted us with our business plan and although he was assigned to another district later he still kept contact with Chamomile to enquire how we are doing. Yes the road has been difficult as we are 1st generation farmers. I don’t have a father or grandfather who can share their knowledge with me. One Friday morning when we woke up we saw that over 800 chickens were dead in the shed. Obviously our 1st port of call was Mr. September who came out immediately and the Dept assisted us in replacing the chickens.

That’s how I ended up with 4000 layers. Through trial and error we moved on. Currently I am erecting a layer house with the help of the Department of Agriculture of Western Cape that will be housing 10 000 layers with a fully automated operation.

As I was starting out with the layers I also planted dhanya for the house and the very same happened as with the eggs and soon I supplied the local shops and butchers. Then one time I planted chillies for a client and he wanted red chillies and as chillies gets weighed for pricing I only then realised that I have to wait longer for the chillies on the plants as it goes from green to red and by the time it turns red it weighs much lighter which means I will be losing out on the crop on the rand per kilo. That’s when I took the telephone book and just went through the ‘Fresh‘ names and came onto Freshmark and enquired by Jenifer, a buyer at Freshmark and she assisted me. Since then I have never looked back. Freshmark has helped us grow and currently we are supplying them daily up to 600 bunches dhanya a day as to when we started out delivering thrice weekly. My produce goes through to the DC daily with our mentor Johan Terblanche who does not charge us anything and is our on call Farmer assist 24 /7. He has been helping us on the 21 Ha land we are currently leasing from Rural Development.
Farming has been our only source of income and we are determined to make a success of it. Two of our sons have since come onboard to work with us in the business. I have since taken a back seat with the hard work outside on the land and in the chicken shed but my work capacity has since increased as with any business that grows so does the paperwork and I am currently the lady behind the desk and on the phone.

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EXTENSION EDUCATION AND TRAINING PRESENTATION AND PANEL DISCUSSION.

The following institutions made a presentation during the session:
   1. Academy of Science of South Africa (ASSAf).
   2. NMMU –Saasveld campus.
   3. Owen Sithole College of Agriculture – KZN.
   4. Central University of Technology/ Glen Agricultural College.
   5. Elsenburg Agricultural Training Institute, Faculty of Extension.
   6. University of Limpopo.
   8. Tshwane University of Technology.

The session was closed with a presentation on the Sasakawa Africa Fund for Extension Education (SAFE) - Supervised Enterprise Projects (SEP’s).

SOME OF THE PRESENTATIONS IN MS POWERPOINT FORMAT OF THIS SESSION IS INCLUDED IN A SEPARATE FOLDER ON THE CD. THE FOLDER’S NAME IS: CONFERENCE 2014 - POWERPOINT PRESENTATIONS / EXTENSION EDUCATION AND TRAINING PANEL DISCUSSION.
DISCUSSION OF SACNASP REGISTRATION OF EXTENSION OFFICERS.

Becker, R.\textsuperscript{5}

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\textsuperscript{5} Executive Director, SACNASP, Pretoria. Email: rbecker@geoscience.org.za
THE DEVELOPMENT OF CURRICULA FOR A DIPLOMA IN AGRICULTURE IN SOUTH AFRICA’S COLLEGES OF AGRICULTURE.

Worth, S.6,

1. INTRODUCTION

Currently, there are 12 Colleges of Agriculture of which (at the time this research was conducted) nine were accredited to offer Higher Education (HE) qualifications. These colleges have a long but varied history within the agricultural education and training (AET) sector. Some have managed to weather the transitions in educational and agricultural policy; others have struggled to find their space. The changes in both areas suggested a review role of these institutions, of the qualifications they offer and of the curricula supporting them.

The fact that not all of the colleges still offer HE qualifications is indicative of the uncertainty that the colleges have faced over the last 20 years. Historically and essentially until 1994, South Africa’s colleges of agriculture, the earliest of which (Elsenburg) was started in 1898, were racially divided and under very separate financial and administrative mandates. While they all eventually offered Higher Certificates and Diplomas in Agriculture, there were significant disparities among them.

In general, the ‘white’ colleges were set up to train farmers and drew their students from farming families, most commonly near the particular college. Generally these colleges were well resourced. The historically ‘black’ colleges have diverse histories. For the most part they arose as a part of the homeland system. Whatever their original purpose, most quickly moved into the business of training extension staff for the burgeoning homeland departments of agriculture. Funding of these colleges was inconsistent, but generally far less resourced than the former ‘white’ colleges (Worth, 2008).

Since 1994, much attention has been given to reorganising agricultural education and training (AET). In 2005, the National Department of Agriculture published its national AET strategy that sought to bring coherence to a highly disparate system which, in terms of the agricultural colleges, resulted in significant variations in the structure, content, quality and results of the respective AET curricula (NDA, 2005). At the time, it could not, with any degree of confidence, be assumed that a diploma in agriculture obtained at one college was equivalent to a diploma in agriculture obtained at another college (Worth, 2008).

The 2005 AET strategy led to a number of investigations into the positioning of agricultural colleges. These investigations essentially drove policy to create the desired coherence through reinvestment in infrastructure, personnel (training) and curriculum development. Perhaps most significantly was the creation of a set of norms and standards

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6 University of KwaZulu Natal. Email: worths@ukzn.ac.za
to guide quality assurance along the key fronts of the colleges’ activities including curriculum, staffing, governance, quality control and facilities (NDA, 2009).

On the governance front, disparity among the colleges was largely due (with the exception of one) to their being managed by provincial Departments of Agriculture, despite HE being a national competency. They were subject to provincial strategic and political issues, were not viewed as national institutions and had very little autonomy over their key functions. Current policy, which is presently being drafted into a bill, is facilitating three fundamental changes. First is the intent to declare the colleges as national educational institutions and to position them as semi-autonomous institutions similar in status to a government school. Second is the transformation of the colleges into Agricultural Training Institutes (ATIs) empowered to offer academic qualifications in the Further Education and Training (FET) band (NQF levels 1-4) and in the HE band (NQF levels 5-7). Third is to structure the colleges with consistent governance structures, subject to the same policy frameworks and funding formulae, thereby removing the underpinnings of disparity (NDA, 2009).

Inevitably, all of these changes must find their expression in curricula that deliver qualifications that are consistent with educational standards set for HE institutions and are consistent across all the colleges. Being the core of any HE institution, review of curricula offered at the various colleges was essential. Over the years, several of the colleges had reviewed their curricula, but most in an ad hoc fashion. Cedara engaged in extensive structured curriculum review that resulted in developing a Competency-Based Learning curriculum for their diploma in agriculture.

Notwithstanding the work done, there was cause to pursue curriculum review as a research exercise. In this way curriculum review could be grounded in theory and made more systematic, methodical and consistent. Research-led curriculum review could also establish a framework for future and continued curriculum reviews that would simultaneously ensure coherence across all the colleges and relevance to the eventual workplaces absorbing college graduates. This paper presents some of the initial work done along these lines.

2. THEORETICAL FRAMEWORK AND METHOD

This research was grounded in educational theory from which a method was developed with a view to positioning college curricula to deliver the knowledge and skills relevance required. The method was developed to underpin the following research processes:

a) Interrogating the diploma as a qualification to establish the framework for curricula;

b) Identifying key competencies expected of a diploma graduate;

c) Translating competencies into curricular learning outcomes; and

d) Using the outcomes to interrogate the curricula of existing programmes.

In addition to incorporating educational factors, the method needed to be fairly simple so that it could evolve into a tool that could be used for future interrogations of a similar focus in other institutions or similar fields of study.

Drawing on Barnett and Coate’s (2005:70) construct of knowing, being and acting, positing that curricula in which “being and acting are not integrated with knowing offers
a fragmented learning experience...” and may over-emphasise performance rather than encourage the learner to engage deeply and purposefully with knowledge (Barnett and Coate 2005:93). This was augmented by concepts such as dynamic and “interactive curriculum” and a “process-based curriculum” where process rather than content drives the learning agenda; where curricula are planned holistically, encompassing the world’s views and social environment, as well as the specific disciplines as “contexts of experience” within which learners can “engage in personally relevant work.” And where there is a balance between “subject-related processes, general processes and learning to learn processes” thereby suggesting that a key element in evaluation should be the degree to which a curriculum is balanced and represents a process of learning rather than merely reflecting an appropriate content (Nind, 2005:5-7).

The approach was also cognisant the particular challenge for curricula in countries, like South Africa, that are in a state of transition. Educational reform – partly reflected in curricula – should incorporate “development-related functions” and address a range of change issues aimed at fostering development (Earnest, 2006: 7).

A key driver in the method adopted was the importance of consensus in curricula which is particularly relevant to South Africa where so much is at stake in terms of its development objectives. In this instance, in keeping with the findings of Cappell and Kamens (2002) and Earnest (2006) curriculum review (and subsequent development) should:

- Facilitate consensus to foster curricular coherence;
- Harmonise curricula with development objectives;
- Be conducted in the light of the state’s transformation agenda; and
- Deliver curricula that engender the mindset of transformation as an outcome of learning.

These four points suggested a reflective process in which learners, educators and the state collaborate to reflect and adjust curricula on a sufficiently frequent basis to ensure learning is kept coherent and relevant.

2.1. Theory-led Instructional Design Curriculum Evaluation and Design (TICED)

The primary investigation entailed a series of curriculum review workshops involving the leadership and academics conducted at three South African Colleges of Agriculture offering a Diploma in Agriculture: Cape Institute for Agricultural Training; Glen Agricultural College; and Lowveld College of Agriculture. All lecturing and managerial staff at the colleges were invited to participate in the workshops each of which were conducted over 5 consecutive days. The pattern of engagement was based on focus group discussions (Kidd & Parshall, 2000; Smithson, 2000; Peters, 2009).

This was augmented by a consultative process leading to the development of the Bachelor Agriculture at the newly established University of Mpumalanga and an initial review of the existing Bachelor of Agriculture at the University of KwaZulu-Natal – the latter of which is now the focus of a doctoral study.
The data gathered through these processes were analysed using the Theory-led Instructional Design Curriculum Evaluation and Design (TICED) method developed in South Africa in 2008 as shown in Figure 1 (Worth, 2008). Table 1 provides a brief overview of the TICED method.

Table 1: Overview of the TICED method

<table>
<thead>
<tr>
<th>Step</th>
<th>Process</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Question assumptions</td>
<td>Identify and deliberately question the assumptions on which an existing curriculum is based to form a foundation for a new or modified theory driving the field of study for which the curriculum is to be evaluated</td>
</tr>
<tr>
<td>2</td>
<td>Establish theory</td>
<td>Affirm, modify or formulate a new theory for the field of study for which the curriculum is being evaluated</td>
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<tr>
<td>3</td>
<td>Reflect on implications</td>
<td>Reflect on the implications of the established theory and creative and imaginative extension of the theory into processes, knowledge and skills that might emanate from the theory irrespective of what is currently in place in curricula</td>
</tr>
<tr>
<td>4</td>
<td>Design learning outcomes</td>
<td>Determine what is to be learned and what the learners should be able to do when the instruction in completed (Dick et al, Undated: 15).</td>
</tr>
<tr>
<td>5</td>
<td>Develop the evaluation framework</td>
<td>Formulate questions and methods of data collection and analysis based on the theory developed (Donaldson, 2003).</td>
</tr>
<tr>
<td>6</td>
<td>Evaluation</td>
<td>Using the framework, evaluate curricula to determine the extent to which the curriculum has adapted itself to accommodate the new theory and learning outcomes</td>
</tr>
<tr>
<td>7</td>
<td>Question assumptions</td>
<td>Re-question (new) assumptions to avoid the ‘danger’ of the theory becoming fixed (Townsend &amp; Adams, 2003).</td>
</tr>
<tr>
<td>8</td>
<td>Re-form theory</td>
<td>Re-affirm or amend the current theory or establish new theory or to establish a new theory.</td>
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<tr>
<td>9</td>
<td>Design learning outcomes</td>
<td>Translate theory into measurable theory and practice learning outcomes in a range of areas that give practical substance to the theory.</td>
</tr>
<tr>
<td>10</td>
<td>Develop learning programmes</td>
<td>Organise learning outcomes into creative learning programmes that include activities, modes of instruction, development of materials and tools of assessment including combining learning outcomes in learnable units.</td>
</tr>
<tr>
<td>11</td>
<td>Implement learning programmes</td>
<td>Implement the learning programmes consistently and with integrity.</td>
</tr>
<tr>
<td>12</td>
<td>Evaluation</td>
<td>Assess the results of the programme in terms of the intended outcomes and in terms of the modes of learning and materials used</td>
</tr>
</tbody>
</table>

(Source: Adapted from Worth, 2008)

3. RESULTS

This study covered steps 1-10. It did not take the process through to implementation and re-evaluation. The results of the study are enumerated under each of the processes of the TICED method. The data are presented in aggregate and not per institution.

3.1. Questioning assumption

Two key assumptions were questioned:
- the purpose of the diploma in agriculture; and
- the concept of competency (on completion of the diploma).

Purpose of the diploma: The study found that there has been a significant shift in the purpose of the diploma. Historically the diploma had been designed either to produce farmers (in the former ‘white’ colleges) or extension practitioners (in the former ‘black’ colleges). It was noted by most of the participants that the largest employer of graduates was now private sector/corporate agriculture where graduates were employed as section managers or technicians. Further, it was noted that the National Department of Agriculture had changed the qualification requirement for hiring extension staff. Whereas previously a diploma was accepted, a Bachelor of Science in Agriculture was now required.

The focus groups also noted that the purpose of the diploma had also been affected by the background of the students sitting the diploma. Increasingly, the students entering the diploma had no agricultural background. For the most part, the students had not, as had been the case in the past, grown up on farms. Many had no previous experience with agriculture or farming with the effect that few expected/planned to become farmers.

Notwithstanding the changes noted, the focus groups suggested that training future farmers should remain one of the four ‘first-stop’ career streams. The other two were: entry-level farm production manager/supervisor; private sector extension and agricultural education – the latter two with further training.
3.2. Establishing theory

Reflecting on the changes in the purpose of the diploma, it was determined that the structure of the curricula needed to be more flexible to enable it to respond more readily to changes in the ‘job market’. The concept thus developed was “first day competencies” which referred to the knowledge, skills, attitudes and behaviours expected of a graduate on the first day on a job. This became a powerful theory for curriculum design and, unexpectedly, for negotiations with potential employers who were later involved in developing learning outcomes.

3.3. Reflection on implications

The focus groups agreed that irrespective of the ultimate ‘first job’, there were two key elements in each of these “first-job” options:

- Each entails an element of minimally supervised management; and
- Each entails technical competency in one of two agricultural production systems (crop production or livestock production).

These translated into a description of the graduate. While each of the institutions has somewhat different wording, they all were described along the following lines: “A technically competent graduate with knowledge and skills to manage livestock/crop production with minimal supervision in the context of a profit-making farm business.”

In considering this description, the focus groups also agreed that irrespective of the ultimate ‘first job’, all diploma curricula should be organised around the following key learning areas:

- Agricultural production;
- Farm business management;
- Natural resource management; and
- Farm engineering

A third result of reflection was the concept of laddered learning. This gave structure and coherence to the process of developing learning outcomes, which structure was build as a matrix that would track learning across the four key learning area over the three years normally associated with a diploma. Table 1 shows the framework of the matrix.

Table 1: Learning ladder matrix

<table>
<thead>
<tr>
<th>Year of study</th>
<th>Production</th>
<th>Farm Business Management</th>
<th>Natural Resource Management</th>
<th>Farm Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
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<td>2</td>
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<td>1</td>
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</tbody>
</table>

3.4. Initial learning outcomes

Among the concepts explored in the focus groups was the concept of level descriptors. These are statements describing the learning and achievement of a student across 10
factors: Scope of knowledge; Knowledge literacy; Method and procedure; Problem solving; Ethics and professional practice; Accessing, processing and managing information; Producing and communicating information; Context and systems; Management of learning; and Accountability (SAQA, n.d.). Level descriptors are set for each of the NQF levels. The Diploma is a NQF level 6 qualification, and is to be comprised of learning outcomes from levels 5 - 7.

The level descriptors were used to guide the focus group discussion around learning outcomes. This was a lengthy process that resulted in a wide range of outcomes for each of the key learning areas. Outcomes were placed in a hierarchy of learning according to their fit with the level descriptors and were allocated to a year of study within a key learning area within the matrix.

3.5. Evaluation framework

Learning area focus groups used the outcomes to derive a set of simple questions with which they could interrogate current curricula. Questions generally centred on issues of knowledge and skills seeking to determine if the outcomes did or did not exist in the current curricula, which outcomes in the current curricula were superfluous and which of the outcomes in the current curricula should be added to the learning ladder.

3.6. Evaluation, re-questioning assumptions and reforming theory

While presented as separate processes, steps 6, 7 and 8 were actually carried out simultaneously and organically. At each college the focus groups interrogated their respective curricula and returned with refreshed learning outcomes for their respective learning areas. Most curricula were found in need of significant amendment to the new learning outcomes. One significant finding was that some of the modules over-lapped while others conflicted – indicating that curricula had been developed insolation; lecturers had not collaborated in developing curricula. Another important finding was that curricula tended to be content- rather than process-based and that this often led to over-teaching. This was particularly true of the exit-level modules which, in keeping with the level descriptors, should present information as contested and negotiable. The theoretical concept of creating a structured but flexible curricula was reaffirmed and greater emphasis was place on process based learning, particularly at exit level. Further, the study found that the review and design process was made much easier by having the original qualification purpose statement as the ultimate conceptual guide.

3.7. Revised learning outcomes

The primary outcome of this process was the creation of ‘exit level outcomes’ which effectively represented the summation of the ‘first day competencies’ referred to earlier. The study found that these were crucial to curriculum design as they provided the end-focus for each key learning area. These, together with the qualification purpose statement, facilitated evaluation and design. Characteristic exit level outcomes are captured in Table 2.
Table 2: Characteristic exit level outcomes for a Diploma in Agriculture

<table>
<thead>
<tr>
<th>Key Learning Area</th>
<th>Exit level outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Production</td>
<td>Plans and Manages a production system in a sustainable manner to optimize economic return</td>
</tr>
<tr>
<td>Farm Business Management</td>
<td>Manages agribusiness finances as a means of planning and monitoring the management of the enterprise</td>
</tr>
<tr>
<td>Natural Resource Management</td>
<td>Makes informed decisions regarding sustainable land use (selects a feasible enterprise(s))</td>
</tr>
<tr>
<td>Farm Engineering</td>
<td>Manages the farm infrastructure and machinery</td>
</tr>
</tbody>
</table>

3.8. Learning programmes

SAQA (2005:4) states that “A learning programme consists of learning and assessment activities derived from the outcomes that make up the qualification.” It is considered to be different from a qualification which is the formal recognition of learning that has been achieved. Thus in this instance, the focus groups determined that the qualification was the Diploma in Agriculture and the learning programmes were the arrangement of various modules around an area of specialisation such as crop and animal production. These programmes were captured in the form of a “programme template” which captures the learning outcomes, the assessment criteria and methods, the teaching and learning approach, and a range of other related information. It was determined that a programme could be created around any one or any combination of production learning areas, but that a Diploma in Agriculture could not be offered without a production core. The most logical were specialisations in crop or animal production, or a combination of the two. In making this determination, it was noted that institutions such as the CIAT would have to determine whether their value-adding focus (e.g. wine-making), while being a viable qualification (and learning programme), may fall outside the nomenclature of a Diploma in Agriculture.

The study found that it is at this stage that a college would create its unique space within the coherent framework of college offerings. It could draw on its unique circumstances, as has been the case with several of the colleges. CIAT specialises in wine and related fields, Lowveld in subtropical fruit and Glen in dryland cereals. Each of the colleges should be able to find its niche specialisation in which it can create unique learning programmes within the harmonised framework of a Diploma in Agriculture.

4. CONCLUSIONS AND EXTENSION IMPLICATIONS

The investigation delivered two main sets of results: a clearer understanding of the function of the NQF level 6 National Diploma in Agriculture in the agricultural sector; a generic framework for the diploma, driven by the concept of ‘first day competencies’ structured around key learning areas of agricultural production, farm business management, natural resource management and farm engineering.

The National Diploma, if structured appropriately still has a significant contribution to make the agricultural sector in South Africa. Although the diploma was previous a
primary training space for public sector agricultural extension, this is no longer the case and no longer a viable option for the colleges of agriculture. However, industry – particularly the primary production sector – finds the qualification valuable if the students leave their respective institutions with relevant ‘first day competencies’.

This will require immediate review and redesign of existing curricula as well as establishing and implementing mechanisms and systems to keep the curricula relevant to industry needs. Part of this will entail the way AET is offered at the colleges with particular reference to how information and content are handled within the framework of level descriptors which drive curricula away from content, recall-based learning to managing contested information.

REFERENCES


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THE ROLE OF EXTENSION AS A PROFESSION IS CRITICAL IN DELIVERING EXCELLENT SERVICES.

Zwane, M. E.7,

ABSTRACT

The paper argues that professionalism also affect agricultural extension in service delivery by creating demotivated cadres in agriculture. It also provides clarification of the concept of professionalism. It draws data from researchers who did extensive work in the area of professionalism and the registration of profession, the paper seeks to achieve the following: 1) provide concrete principles of professionalism, 2) identify critical obstacles associated with professionalism, 3) review progress on efforts done to date in South Africa about professionalism in extension, 4) and highlight the qualities extensionists are expected to possess. Only three districts in Limpopo participated in a sample of 30 extension officers. They were interviewed on the opinions on skills requirements of extension profession.

The sample was analyzed through SPSS programme. The results revealed that certain skills are important to be possessed by the extension practitioners as seen by its rating: public speaking 86%, writing 72%, listening 69%, research linkages 83%, leadership 76.6%, critical thinking 63%, supervisory 70% and communication planning 83.3%. But when respondents were asked to judge themselves on the functionality of those skills, it was found wanting. The paper concludes with some recommendation.

Key words: profession, professionalism, excellent services.

1. INTRODUCTION

The debate about the concept of professionalism in agriculture is not new. Its relevancy, justification, promotion as well as its meaning has been a burning concern among academics, extension practitioners and policy makers and the public to some extent which questions the visibility and the image thereof. Academics responded by conducting research and presented papers in conferences (Terblanche, 2007; Jibowo, 2007, Koch, Terblanche, 2013, Lukhalo, 2013). Extension practitioners on the other hand were vocal through their agricultural societies who developed proposals and took part in research to come up with research to justify the need for opening up for agricultural extension science profession. The policy makers represented by the Department of Agriculture Forestry and Fisheries (DAFF) and Provincial leadership have provided an enabling environment for holding and pursuing a position to address the foregoing concerns. It should be mentioned that these parties who showed their willingness to cooperate have made it possible for the South African Council for Natural Scientific Professions to recognize Agricultural Extension as one of the field of practice within the South African context of the natural scientific professions act of 2003. The objective of this paper is fourfold: 1) to provide concrete principles of professionalism, 2) to identify critical obstacles and solutions linked to professionalism, 3) review progress on efforts done to

7 Manager for Extension Services in Limpopo Department of Agriculture, 69 Biccard Street, Polokwane, 0700. Email: zwanefrank@gmail.com
date in South Africa about professionalism in extension, 4) and to discuss the findings of the research on what could be the most important roles of the extension as a profession.

2. THEORETICAL BACKGROUND

The journey towards professionalism in South Africa was championed by not a single person but a collective each one doing a part in the process. The South African Society for Agricultural Extension (SASAE) made some efforts by participating in the Standard Generating Body (SGB) (Enslin, 2006) and it further developed an extension landscape which categorize its members towards professionalism (De Beer, 2005). The landscape became a foundation of the categorization of the membership as seen in the new document outlining the registration of practitioners in 2007. SASAE reminded its members when it featured “professionalism” as a theme in one of its annual Extension Conference. Other role players such as DAFF expressed the need for professionalization of Extension and Advisory Services (Norms & Standards, 2005).

However the critical time was reached when DAFF commissioned a feasibility study on the establishment of a professional South African Extension and Advisory body. South Africa is one of the model country in Africa considered to have the potential to influence development in Africa. But when it comes to Agricultural Extension it has lagged behind partly because it did not have an extension policy. According to Lukhalo (2013), the policy process got underway during 2012 and it can be argued that lack of an operational agricultural extension policy in South Africa, has delayed the recognition of extension as a profession. The existence of such a policy could have created a quick enabling environment to professionalize extension service. However it should be indicated that the establishment of the Extension Recovery Plan (ERP) in 2008 has influenced the process of professionalization of extension. A profession is determined by a number of traits.

Goode (1960) identified ten traits which are still relevant today as confirmed by (Wikipedia, 2014; Düvel, 2007). They are: 1) the profession determines its own standards of education and training, 2) the student profession goes through a more far-reaching adult socialization experience than the learner in other occupations, 3) professional practice is often legally recognized by some form of licensure, 4) Licensing and admission boards are manned by members of the profession, 5) most legislation concerned with the profession is shaped by that profession, 6) the occupation gains in income, power, and prestige, ranking, and can demand higher caliber students, 7) the practitioner is relatively free of lay evaluation and control, 8) the norms of practice enforced by the practice are more stringent than legal control, 9) members are more strongly identified and affiliated with the profession than are members of other occupations with theirs. 10) The profession is more likely to be a terminal occupation.

3. RESEARCH METHODS

This study formed part of a larger study conducted by a team of extension experts in the SADC region. It was the arrangements that each country will conduct individual study. The author was responsible for South Africa, however due to the size of the country and other logistical issues such as time and budget arrangements and such as budget and time, data was collected from only three (3) of the five (5) identified districts in the province.
The purposively selected districts (Table 1) were Capricon (12), Sekhukhune (9) and Vhembe (9).

Table 1. Sample size

<table>
<thead>
<tr>
<th>Name of district</th>
<th>Number of respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capricorn</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>Sekhukhune</td>
<td>9</td>
<td>30</td>
</tr>
<tr>
<td>Vhembe</td>
<td>9</td>
<td>30</td>
</tr>
</tbody>
</table>

A total of thirty extension workers participated in the study. Although the purposively selected sample size of 30 might not be representative of the extension population in Limpopo Province and also, while this makes the findings not to be generalizable to the province (Dillman, et al. 2009), the results are still very much relevant and worth reporting as they address issues of importance in agricultural extension.

4. RESULTS AND DISCUSSION

The overall purpose of the study reported here was to identify and prioritize the professional development needs of Extension in the tree districts of Limpopo.

4.1. OBJECTIVE 1: Demography of the respondents

The study presents results which are divided into demography, gender, and the requirement of professionalism. This was one of the objectives of the study to establish the demographic profile of the extensionists.

4.1.1 Gender

The majority of the respondents were male constituting 70 percent and 30% female. This is not surprising because a study conducted in Limpopo Provinces of South Africa display a similar tendency (Zwane, 2009). This could be seen as a legacy of colonialism and apartheid which connoted a negative image to women’s roles in society.

4.1.2 Marital Status

The respondents were asked to indicate their marital status. The findings reveal that 76.7 percent were married, 20 percent single but not married and 3.3 percent indicated being single parents. Experience has shown that there is stability in the workforce with individuals who are married as compared to single or people co-habiting.

4.2 OBJECTIVE 2. PRINCIPLES OF PROFESSIONALISM,

The word profession and professionalization, and professionalism could be used interchangeably as if they mean the same thing. In terms of Wikipedia (2014) Professionalization is the social process by which any trade or occupation transforms itself into a true profession of the highest integrity and competence. This process tends to involve establishing acceptable qualifications, a professional body or association to
oversee the conduct of members of the profession and some degree of demarcation of the qualified from unqualified amateurs. Whereas professionalism refers to a wider perspective because the title has been adopted by criminals who see themselves as professionals (Terblanché, 2012).

However the term profession refers to a vocation founded upon specialized educational training. The purpose of which is to supply objective counsel and service to others (Wikipedia, 2014), Extensionists who have received the correct training see themselves as professionals. The acceptance of extension as a field of profession is opening doors for the extensionists to practice professionalism It is important to note that a profession is widely accepted to be an occupation that requires extensive training and the study and mastery of specialized knowledge, and usually has a professional association, ethical code and process of certification of licensing (Düvel, 2007).

Practicing a profession depends on the Acts, for example in Canada extension and advisory are governed by the Agrologist Act, of 1994 whereas in South Africa it is governed by Natural Scientific Professions Act (Act No. 106 of 1993) which was later replaced by Act No. 27 of 2003) (Düvel, 2007). Gibson and Hillison (1994) suggest that effective extension specialists must understand the Extension education process. In addition, they must understand the human development, learning, and social interaction processes, and they must become knowledgeable about the organization within which they work and this has been supported by other researchers for example (Düvel, 1990 notes that a profession should be a job with an intellectual character and the major elements of such a profession should include: philosophy, body of knowledge, leadership, guidelines for behaviour, and admission requirements.

4.3 OBJECTIVE 3 REVIEWING PROGRESS ON PROFESSIONALISM IN EXTENSION IN SOUTH AFRICA

The tools and procedure used as forerunner in the process have been documented. It suffices to indicate that four policy documents were developed by the Department of Agriculture, Forestry and Fishery. They include: Norms and Standards in 2005, the development of Extension Recovery Plan in 2008, the feasibility study on professionalism in 2012, and the draft Extension Policy in 2012 (Lukhalo (2014). The efforts of DAFF and its partners have led to SACNASP agreeing to accommodate Agricultural Extension Science as a field of practice in South Africa (Bekker 2013).

South African Council for Natural Scientific Professions (SACNASP) and South African Society of Agricultural Extension (SASAE) have played a major role in the process. What need to be worked out is the logistics of registration by extension practitioners. There are criteria developed for this purpose. They are: Professional Extension Scientist (Pr. Ext. Sc.), Candidate Extension Scientist (Cand. Ext. Sc.), Extension Technologist (Ext. Techn.); Candidate Extension Technologist (Cand. Ext. Techn.); Associate Extension Technician (Assoc. Ext. Tech.); The criteria to determine a registration category is based on the number of extension credits earned at a certain level of study (e.g. a Masters qualification with a minimum of 120 credits in extension) and the years of appropriate working experience in extension (Beker 2013).
4.4 OBJECTIVE 4 CRITICAL OBSTACLES ASSOCIATED WITH EXTENSION PROFESSION

Any profession faces challenges and obstacles. One of the critical factors is the size of the participating professionals. It has been acknowledged that the number of extension officers are insufficient in South Africa for example South Africa has a total number of 2200, (Terblanche 2012) however this number was increased by the provisions made in the Extension Recovery Members of a profession may encounter conflict when working with personnel from other professions. It is a group of professionals each with his own training, professional societies, and code of ethics (Düvel, 2007). Another observation is that the attitude of a professional determines his productivity.

A professional who has been trained by an organization tend to be loyal to the organization and may receive more reward compared with a professional who came outside the organization, who may not look to his boss for approval but to his peers (Hurd 1967). It has been noted by researchers that shortage of trained and experienced agricultural extensions in South Africa has been the subject of much debate in recent years (Terblanche, Koch, and Lukhalo, 2012). Some of the obstacles that are the impediments in professionalism in extension have been documented which include inadequate specialization in Extension, inadequate financial backing, inadequate research culture, low impact, and competition by other disciplines in the field of agriculture (Jibowo, 2007).

4.5 OBJECTIVES 5. PROFESSIONAL REQUIREMENTS OF EXTENSION

4.5.1 Public speaking

It has been asserted that agricultural Extension has made limited impact in many countries in bringing about production of food surplus in a sustainable manner (Jibowo, 2007). The study revealed that extension practitioners rated public speaking 86%. This is not surprising because specialists need to develop skills in documenting program impact and also in communicating that impact to their stakeholders. This view was supported in a different survey conducted by Clemson University (Radhakrishna, 2001).

4.5.2 Writing skill

Extension specialists have the responsibility to synthesize, evaluate, integrate, and apply research information. The study found that this criterion was rated 72%. This skill is indeed very important for the specialists because they need to apply the information. (Taylor & Summerhill, 1994) found that expertise from within the land-grant university system was performing this task in support of county programming efforts.

4.5.3 Listening skills

This criterion was rated 70% to indicate its importance. Several studies reveal that Extension specialists are one of the primary sources of information for county agents (Radhakrishna & Thompson, 2001).
4.5.4 Communication planning

According to Van den Ban (1990), applying relevant skills should be seen as communication in agriculture, this has improved the returns on investment. The study has rated this criteria 83.3% and this has been supported by to be important because of this belief that agricultural extension involves dissemination of improved knowledge to farmers and assisting them to apply them (Jibowo, 2007).

4.5.5 Leadership

Terblanché (2007) indicated that extension specialist needs to be able to manage. Coupled with management is leadership. This criteria was rated 76.6%. The importance of this quality has been confirmed by Radhakrishna (2001) who noted that Specialists are key individuals in providing the technical information that drives county Extension programming.

4.5.6 Critical thinking

The study found that this criterion was rated 63% Extension specialists perceive this criteria to be very important hence it was rated above 50%. The reason is because they perceived a specialist to possess a high level of competence in critical thinking. Nearly half of the professional development needs examined in this study. This finding was confirmed by Radhakrishna (2001).

4.5.7 Research linkages

Hagman (1999) observed that the traditional approach to liking research with farmers has been strongly criticized due to its linear approach. This criterion has been rated 83%. This is a high percentage which acknowledge its importance. This view has been carried by many traditional researcher who held the view of its importance for a wrong reason, for example Radhakrishna (2001) agreed that extension specialists need to step up their efforts to communicate client problems to researchers so that appropriate Extension programs and/or solutions can be offered.

4.5.8 Supervision skills

Mathabatha & Düvel (2005) found that supervision has played a role in ensuring that the relationship between the subordinates and the leadership remain positive. However where the subordinates were asked to rate their supervisors it was not satisfactory. Whereas when the supervisors were asked to rate themselves they all rated above 70%. The study found that this criterion was rated 73%. This is a opinion of the subordinates. It still sends a strong message that supervision is important for the specialists.

4.5.9 Group facilitation

Düvel (2007) identified the important skills which he felt are very important for a professional extensionist to have namely management, supervision and group facilitation. The study found that this criteria was rated 70%. This shows the seriousness of this skill.
5  CONCLUSION AND RECOMMENDATIONS

In conclusion it should be stated that professionalizing extension and advisory practitioners in South Africa should be considered highly by all stakeholders interested in agricultural development. It is the writer’s view that the absence of a professionalized extension science has caused much damage to the dignity of the extension and advisory practitioners. The reason is that some of the extension practitioners got demotivated. The impact of the damage is that some of the extension practitioners have become demotivated and therefore are compromising service delivery. Professionalization of agricultural extension was not an easy one. We can bear witness that this has been the product of different stakeholders working together for a common cause.

The paper has succeeded in highlighting the achievement of the objective of the paper. Of critical significance is the fact that respondents have confirmed the 9 qualities as critically important to be possessed and practiced by all professionals. All these qualities were rated above 60%, which further demonstrate how important these criteria are to be possessed by extension practitioners. The finalization of the agricultural extension to be part of the profession within the confines of the South African Council for Natural Scientific Professions requires that efforts be taken consciously to deal with the challenges of poor service delivery. For this reason few recommendations are made in 5.1.

5.1  RECOMMENDATION

As indicated that a profession consist of disciplinary procedures and the philosophy, it is recommended that:

- The parties involved should come up with a set of rules to handle, monitor and manage the profession in a professional manner.
- An action plan needs to be developed in order to bring or maintain a variety of competences among the extension practitioners, who should strive for excellence in order to improve service delivery.
- Extension practitioners need to be encouraged to conduct extension research.
- A code of ethics should be made known to all members.
- That the Department of Agriculture Forestry and Fisheries (DAFF) should facilitate capacity building through seminars to the serving personnel as a way to instil a sense of accountability to the profession.
- The members of the profession should always be reminded of the code of ethics of the agricultural extension profession.

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COMPARATIVE ANALYSIS OF SUCCESS AND FAILURE FACTORS OF FARMER-BASED ORGANIZATIONS IN SASAKAWA AFRICA FOCUS COUNTRIES

Kanté, A. 8, Muthimba, J. 9 Akeredolu, M. 10 & Jibowo, A. A. 11

1. INTRODUCTION

A key and indispensable element for the protection and enhancement of the smallholder agricultural sector is the existence of strong farmer based organizations (FBOs) that are capable, motivated and sufficiently independent to effectively represent farmer interests (Mutimba, 2005). Also, FBOs can become more active participants in adding value to their production. For the past two decades, this view has guided the design of many programs of assistance to smallholders in Africa (Stringfellow, Coulter, Lucey, McKone, & Hussain, 1997). The World Development Report, Agriculture for Development (WDR, 2008) presents FBOs as a major part of institutional reconstructions that allows for collective action to strengthen the position of smallholder farmers in the markets for inputs and outputs. By reducing transaction costs, strengthening their power to demand and bargain and giving smallholders a voice in the policy process, farmer organizations are a fundamental building block of agriculture for development agendas or strategies.

The essential reason of organizing farmers is to be a mechanism for improving farmer access to agricultural services, for improving their economy, for establishing steady relationships with other players such as input suppliers and traders, for generating resources to invest in various operations, for adding value to their production, and for commercializing commodities. In addition, most donors perceived substantial benefits, in offering resources to groups instead of individuals, in distributing resources more rapidly and lowering costs.

In the same scope, the Sasakawa Africa Association (SAA) / Sasakawa Africa Fund for Extension Education (SAFE) group, founded and supported by the Nippon Foundation of Japan, has been assisting smallholder farmers to fight against poverty and to attain food security in East and West Africa. From their field experience, they discovered that the FBOs with whom they collaborated still needed more capacity building because of their low performance (SAA, 2010). This fact was supported long before by Stringfellow et al. (1997), who indicated that, “there is growing evidence, however, that projects promoting farmer cooperation do not always lead to the emergence of viable farmer groups” (p. 2).

8Winrock Sasakawa Africa Fund for Extension Education Coordinator for Burkina Faso & Mali. Email: akante@winrock.org
9Winrock East Africa Regional Coordinator for Sasakawa Africa Fund for Extension Education Bole Sub City, Kebele 13, Gurd Sholla Area Daminarof Building, 4th Floor. P.O. Box 24135, Code 1000, Addis Ababa, Ethiopia. Email: jmutimba@field.winrock.org. Email: jmuthimba@field.winrock.org
10Winrock West Africa Regional Coordinator for Sasakawa Africa Fund for Extension Education. Nigeria. Email: makededolu@field.winrock.org
11Department of Agricultural Education and Extension, University of Swaziland, P. O. Luyengo, Swaziland. Email: aajibowo@yahoo.com
In 2012 therefore, the SAA / SAFE group initiated an organizational and managerial capacity building program for farmer organizations in its four focus countries (Ethiopia, Mali, Nigeria and Uganda). The program was preceded by a study to analyze and compare the factors affecting the viability of FBOs in order to identify their needs for capacity building.

The purpose of the study was to establish the political, social, economic and policy issues and conditions that impact on the development and sustainability of FBOs and establish the type and level of organizations of existing farmer institutions and their organizational structures.

The specific objectives of the study were to:

- Describe the appropriate organizational and management structures for FBOs in the four countries;
- Understand the success behind farmer`s organizations in the four countries;
- Isolate the failure factors behind farmer`s organizations in the four countries;
- Identify the training needs of FBOs in the four countries.

2. METHODOLOGY

The first part of the methodology consists of an extensive literature review information on farmer organizations in Sub-Saharan Africa, followed by focus group discussions, and key informant interviews with actors involved in the formation, governance, management and support of various types of farmer organizations. Purposeful sampling was used to select 36 FBOs in Ethiopia, 40 in Mali, 45 in Northern Nigeria, and 16 in Uganda. Validation workshops were organized in each country before the release and dissemination of the information collected to key stakeholders, including representatives of FBOs that had participated in the study, development actors, private sector players, and government agencies.

In Ethiopia, the study used an adapted guide developed by the World Bank (Dudwick et al. 2006), with a focus on relevant presumed factors such as the organizational capacity, as well as internal and external operating environment of FBOs. The fieldwork was carried out in four administrative regions (Tigray, Amhara, SNNP and Oromia). Besides the Federal Cooperative Agency (FCA), 5 Regional Offices (Cooperative and Extension Directorate offices), 3 Cooperative Federations, 8 Unions, 15 Primary Cooperatives and about 10 Farmer Training Centres (FTCs) were covered. Discussions/interviews were held at different levels with more than 100 persons, including experts, leaders of farmers’ organizations, their managers and/or staff, and DAs stationed at the visited FTCs. In Nigeria, the study was conducted in the states of Adamawa, Jigawa, Kano and Zamfara. The Federal Capital Territory, Abuja was also included in the study so as to cover an apex farmer association as well as rice farmer association (RIFAN).

Qualitative and quantitative data from primary and secondary sources were collected from different respondents in the study area. Review of relevant literature materials, focus group discussions, key informant interview and questionnaire administration were used to collect relevant information. In each state, a research coordinator, assisted by the
Sasakawa Global 2000 state Coordinator in the respective states, used focus group discussion and key informant interviews to collect the required information from the respondents. The rapid appraisal (RA) method was specifically employed particularly to characterize, describe and further understand the farmer based organization in each state. Advocates of the RA methods argue that they are especially strong in addressing qualitative information needs regarding perceptions, concerns, evaluations and attitudes of stakeholders. RA has advantages that include: suitability to the nature of information required and time efficiency of the information gathering process (da Silva and Filho, 2007). The core of the RA methods: key informant interviews, structured direct observations, focus group discussion, community interview, were used.

In Mali, 40 FBOs were sampled in the four administrative regions where SAA operate (Koulikoro, Sikasso, Segou, and Mopti) in collaboration with the Regional Divisions of Agriculture and other technical departments. Two interview schedules were developed and administered to FBOs’ leaders and their members to collect data; two interview guides were also developed for focus group discussions for FBOs’ leaders and their partners. An extensive literature review was conducted in Mali for the collection of secondary data regarding national policy and strategy to promote cooperatives; monitor procedure of cooperatives; management guide for cooperatives; cooperative directory at regional and national levels; laws governing FBOs, etc. In Uganda, the study entailed a review of literature also, focus-group discussions with a range of farmer organizations at different levels, and interviews with key informants in order to identify the various challenges and opportunities for developing strong, viable and sustainable farmer institutions. A field study involving focused group discussions and key informant interviews were conducted with actors among the various players involved in the formation, governance, management and support of various types of farmer organizations.

3. FINDINGS AND DISCUSSIONS

The major findings are related to the specific objectives of the investigation, such as typology of FBOs, factors influencing the success of farmers’ organizations, and the kind of organizational and management structures that would be more suitable for FBOs. The sections in the chapter have been structured accordingly.

3.1 Typology of FBOs:

The study revealed, in the four countries, that different types of FBOs participated in the study. In Ethiopia, they were farmer cooperative societies, the earliest form of farmer-based organizations. In Mali, the SAA partner FBOs essentially cooperatives, associations, unions and rural micro-finance unions. In Nigeria, the FBOs included farmer cooperatives, the Fadama User Association (FUA), commodity interest groups, economic interest groups and water user associations (WUA). In Uganda, they were multi-purpose groups, commodity specific, and advocacy groups.
3.2 Success and failure factors of FBOs:

The study revealed in the four countries that several factors influenced positively or negatively the success and sustainability of FBOs. Table 1 presents the success and failure factors in each country.

3.3 Factors influencing the success of farmers’ organizations:

The main success factors identified in the four countries included:

- tangible benefits to members that would outweigh member resource and time investment in collective actions;
- good enterprise(s) selection and potential for generating surplus income sufficient to finance group running and investment costs;
- motivated, accountable & visionary leadership that had appropriate structures and mechanism for farmers to articulate demand for services and were capable to demand accountability;
- adequate initial external support in depth and duration to activate the social capital and for the initiation of collective activities, particularly in resource poor communities (Mutimba, 2005, Opare, 2007);
- mainstreamed gender concerns in leadership and decision making to get a fair share of input and profit;
- clear and shared vision, mission and purpose for collective action to take place;
- policy and institutional environment to promote the development of farmer organizations and their activities; and
- political stability and security as well as functioning financial markets.

These factors were found to be important for the emergence of strong FBOs.
<table>
<thead>
<tr>
<th></th>
<th>Ethiopia</th>
<th>Mali</th>
<th>Nigeria</th>
<th>Uganda</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Local socio-economic context</strong></td>
<td>Creation of favorable conditions for the implementation of the national policy for the promotion of cooperatives</td>
<td>Political and Policy issues</td>
<td>Clear and shared vision, mission and purpose</td>
<td></td>
</tr>
<tr>
<td><strong>External intervention</strong></td>
<td>Better administrative and financial management</td>
<td>Socio-economic issues</td>
<td>Empowered farmer groups that are able to make decisions effectively and demand accountability</td>
<td></td>
</tr>
<tr>
<td><strong>Demonstration of real benefits to members</strong></td>
<td>The definition of an optimal size which is consistent with good management</td>
<td>Institutional support</td>
<td>Good enterprise(s) selection</td>
<td></td>
</tr>
<tr>
<td><strong>Visionary, enthusiastic and able leadership</strong></td>
<td>The ownership of FO by its members (participation to socio-economic activities)</td>
<td>Internal capacities</td>
<td>Champions to be identified, supported and controlled</td>
<td></td>
</tr>
<tr>
<td><strong>Increasing membership-base and progressive scale-up of activities</strong></td>
<td>The OP management bodies (a model OP creation, operation, respect of regulations)</td>
<td>Appropriate organizational and managerial structures of farmer organizations</td>
<td>Good governance based on constitutionality</td>
<td></td>
</tr>
<tr>
<td><strong>Up-scaling social capital</strong></td>
<td>Gender consideration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>External Linkages and Partnership</strong></td>
<td>working capital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Operating external environment</strong></td>
<td>Socio-economic services delivery to members</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Distinguishing features of successful unions</strong></td>
<td>-viable business plan for co-operatives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Respect of FO objectives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- training adapted to FO need</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.4 Failure factors

3.4.1 Inappropriate approach to the development of farmers’ institutions:

The current observation suggests that the campaign-type approach to re-organizing cooperatives has had negative consequences; led to weak and less viable organizations in some cases, and to demobilization in others. With regard to the latter, the case of Amaya Woreda could be a good illustrative example.

3.4.2 Lack of responsive financial services:

One of the challenges to the success of FBOs across the regions, as identified by the leaders and others, is limited access to finance and the lack of responsive financial services.

3.4.3 Infrastructure, facilities, and their utilization:

The existence of basic infrastructure and other facilities can be crucial for success, depending on the nature of commodities and activities in which farmers’ organizations are involved. As earlier mentioned, often FBOs face difficulty to access credit for such investment.

3.4.4 Public-Private-Partnership: A missing link:

The observation across the regions shows that cooperative/public-private partnership doesn’t exist or is nascent. This is regardless of its potentially useful role for the success of collective action by smallholders. In certain cases, farmer groups/organizations could benefit more from partnering with the private sector, such as in value addition that involves significant processing. Partnership with the private actors could be crucial for this kind of activity, which often requires heavy investment, specialized skills, and entails higher risks (Ferris et al., 2006).

3.4.5 Mainstreaming gender and environment:

Mainstreaming gender is essential for women to access productive resources and institution supports, literacy programs; and increase number of youth groups that engage in income generation activities using communal resources, while also taking care of sustainable management of the resources.

3.4.6 Governance and accountability:

There were corruption and governance problems in some of the unions and federations. Despite increasing corruption problem, resource and logistic constraints of the concerned office made it difficult to provide regular and timely inspection and auditing services to the cooperatives.
3.4.7 Political interference:

The study found some degree of unproductive interference in internal affairs of FBOs. Others demonstrated wrong attitudes and acted, in some instances, in a counterproductive way.

3.4.8 Policy and institutional environment:

Despite the political support to FBOs, the leaders and experts have identified important gaps in the policy and institutional environment.

3.4.9 Other factors constraining the viability of collective actions:

- Limited existing opportunities through collective action by smallholders. Limited access to appropriate technology and inadequate knowledge in specialized technical areas.
- Limited access to appropriate technology for postharvest handling/processing as well as the lack of effective institutional arrangement to enhance their collective bargaining power in the market (fruits and irrigated vegetables).

3.5 Training needs of FBOs:

**Figure 1: Summary of training themes suggested by the FBOs in the four countries:**
The pie-chart illustrates the training needs expressed by FO members. Following the achieved results, training needs are listed in order of importance:

- Literacy
- Production techniques
- Food processing techniques
- Marketing techniques
- Administrative and financial management
- Agricultural entrepreneurship
- Enterprises management
- Transformation and Value Chain

![Figure 1: Summary of Training themes and percentages](image)
3.5.1 Training Modules required by FBOs in the three countries:

The results of this study enable us to list training modules based on needs as expressed by the FO members.

The identified modules are the following:
- Organization of FO,
- Leadership,
- Functional literacy,
- Production techniques,
- Food transformation Techniques for women’s cooperatives,
- Management,
- Management of cooperative structures.
- Agricultural entrepreneurship,
- Value chain for production cooperatives (men/women),
- (men/women) marketing techniques production cooperatives,

4. CONCLUSIONS/RECOMMENDATIONS

Various internal and external factors affected the viability of FBOs studied in the Sasakawa Africa Association focus countries. The key recommendation was that FBOs should be promoted with viable agricultural value chains. Indeed, to revive rural economics, the Sasakawa intervention strategy should include the development of value chain products in each country as agricultural enterprises, the promotion of value addition, and linkage of FBOs with support services and policy decision makers.

4.1 Implication for extension:

Understanding the factors affecting the performance and viability of FBOs is essential for analyzing their needs and planning an extension advisory program. Cooperation, teamwork, and holistic solutions are essential for developing value chains in smallholder farming. Extension program planners should consider reinforcing good communication practices with FBO members, their partners, and all service providers in reaching a shared vision for a better business leadership.

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EDUCATION AND TRAINING OF FARMERS AND EXTENSIONISTS AND ITS ROLE IN SUSTAINABLE AGRICULTURAL DEVELOPMENT IN SOUTH AFRICA.

Raidimi, E. N.12

ABSTRACT

Generally the improvement of a country’s human resource capacity for productivity is a prerequisite for social, economic and technological development. Thus both formal and non-formal education is essential for improving agricultural and rural development. Improving human capital in agriculture is essentially important where shortage of trained human resource is a major limiting factor to development. Significant human capital development is required to fulfil the growing need of skills and expertise to exploit the opportunities in the agricultural sector. This article builds on this discussion. It is a review of experiences on education and training of farmers and Extensionists and its role in sustainable agricultural development in South Africa. It looks at the education and training of farmers and Extensionists and its role in sustainable agricultural development focusing on the current status of agricultural education and training sector, education and training needs of farmers and Extensionists, the role of education and training in sustainable agricultural development and challenges facing agricultural education and training sector in South Africa. The study found that many institutions, both public and non-public offer education and training to both farmers and Extensionists but academic institutions have a central role to play towards this capacity building process. The study also found that agricultural education and training improves the efficiency of agricultural extension service and develops farmer’s skills to improve production. The study conclude that in the process of skilling farmers and Extensionists, the agricultural education and training sector faces many challenges and therefore need to be revitalized.

Key words: Agriculture, education and training, sustainable development, human capital, farmers, Extensionists, skill development.

1 INTRODUCTION

Food security and its relationship to sustainable agricultural and rural development have according to Penning de Vries (2001) increasingly become matters of concern for developing countries and for international community. While there are many complex factors that influence sustainable food security, it is clear as put forth by FAO (1997) and Karl et al, (1997) that education in agriculture plays an important role in preparing farmers, researchers, educators, extension staff, members of agri-businesses and others to make productive contributions.

Agriculture is viewed as a vital means through which poverty and unemployment can be addressed and one of the long-term strategies conceived so far to improve participation in education and training. This sector is an engine for growth and development in South Africa. The central role of agriculture in economic growth and development in South Africa has long been widely recognized. To spur rural development and food security, agricultural education and training in South Africa has, traditionally focused on...

12 University of Venda, School of Agriculture, Department of Agricultural Economics and Agribusiness, Private Bag X5050, Thohoyandou, 0950. Tel: 015 962 8307/0849383313. Email raidimi@univen.ac.za
increasing agricultural productivity on the farm. A critical issue in the 21st century will according to Karl et al (1997) be the changes and adaptations required in agricultural education in order for it to be more effectively contribute to improved food security, sustainable agricultural production and rural development.

Generally the improvement of a country’s human resource capacity for productivity is according to Wallace et al (1996) a prerequisite for social, economic and technological development. Thus both formal and non-formal education is essential for improving agricultural and rural development. Significant human capital development is required to fulfil the growing need of skills and expertise to exploit the opportunities in the agricultural sector. Academic institutions have a central role to play towards capacity building.

In order to meet the challenges of agricultural production and food security facing South Africa improvement of human resource capacity for productivity is a pre-requisite. Both formal and non-formal education is essential for improving food security and rural development and thus reducing poverty. Formal agricultural education is needed for the production of skilled manpower to serve the agricultural sector through extension, research, entrepreneurship and commerce. However, non-formal agricultural education is particularly needed for training of farmers, farm households and workers and for capacity building in a wide range of community based organizations and groups. It is often provided by both public and private organizations. Higher agricultural education institutions are expected to play a leading role in the agricultural training system at national level.

This study builds on this discussion. It is a review of experiences on education and training of farmers and Extensionists and its role in sustainable agricultural development in South Africa. It looks at the education and training of farmers and Extensionists and its role in sustainable agricultural development focusing on the current status of agricultural education and training sector, education and training needs of farmers and Extensionists, the role of education and training in sustainable agricultural development and challenges facing agricultural education and training sector in South Africa

2. METHODOLOGY

This study is a result of intensive literature study (both national and international) on education and training of farmers and Extensionists and its role in sustainable agricultural development in developing world and in South Africa in particular. The study mainly uses a qualitative approach. Most of the qualitative data was derived from secondary sources which involve a discussion of relevant literature from previous studies, administrative records and reports.

3. RESULTS AND DISCUSSIONS

3.1 The current status of agricultural education and training sector in South Africa.

Since the establishment of democratic South Africa government in 1994, visionary policies and programmes, strategies and Agricultural Education and Training, governance structures have according to Didiza (2005) been established. These are supported by
sound legislation. The National Agricultural Education and Training Strategy was launched in the year 2005 with the aim of addressing the needs of the country’s economy and improvement of agricultural production through quality agricultural education and training as well as removing challenges facing the provision of quality Agricultural Education and Training. The Department of Agriculture, Forestry and Fisheries through the Agricultural Education and Training Strategy is committed to enhance equitable access and meaningful participation in agricultural education for all South Africans. The following institutions are used to realize this initiative.

3.1.1 Agricultural Education and Training at Colleges of Agriculture

There are twelve public Colleges of Agriculture in South Africa offering qualifications at NQF Level 1 to NQF Level 6 as shown in Table 1 below. These colleges are managed under the auspices of Provincial Departments of Agriculture and the National Department of Agriculture.

**Table 1: Colleges of Agriculture offering Agricultural Education and Training in South Africa**

<table>
<thead>
<tr>
<th>Name of the College</th>
<th>Province</th>
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<tbody>
<tr>
<td>Cedara</td>
<td>KwaZulu Natal</td>
</tr>
<tr>
<td>Elsenburg</td>
<td>Western Cape</td>
</tr>
<tr>
<td>Fort Cox</td>
<td>Eastern Cape</td>
</tr>
<tr>
<td>Glen</td>
<td>Free State</td>
</tr>
<tr>
<td>Grootfontein</td>
<td>Free State</td>
</tr>
<tr>
<td>Lowveld</td>
<td>Mpumalanga</td>
</tr>
<tr>
<td>Madzivhandila</td>
<td>Limpopo</td>
</tr>
<tr>
<td>Owen Sithole</td>
<td>KwaZulu Natal</td>
</tr>
<tr>
<td>Potchefstroom</td>
<td>North-West</td>
</tr>
<tr>
<td>Taung</td>
<td>North-West</td>
</tr>
<tr>
<td>Tompi Seleka</td>
<td>Limpopo</td>
</tr>
<tr>
<td>Tsolo</td>
<td>Eastern Cape</td>
</tr>
</tbody>
</table>

The common qualifications are the Higher Education Certificate (HEC) in Agriculture (NQF Level 5) which takes two years and the Diploma in Agriculture (NQF Level 6), which is pursued for a further one year on completion of the Higher Certificate in Agriculture. The Higher Certificate and the Diploma programmes are accredited by the Higher Education Quality Council (HEQC) of the Council for the Higher Education (CHE), while the programmes in NQF Level 1 to 4 are accredited by Umalusi and AgriSETA. Prospective farmers, Extensionist, animal health and engineering technicians are trained at these colleges.

The different training programmes offered by the above mentioned colleges, support skill development in the agricultural sector. This covers according to Department of Agriculture Information services (2005/2006) diversified training needs from the role players such as emerging farmers, commercial and small-scale farmers and for the benefit of different members of the community (youth, women, and people with disabilities) farm workers and other role-players in the sector.
3.1.2 Agricultural Education and Training at Universities of Technology.

There are five Universities of Technology in South Africa offering Agricultural Education and Training (Table 2 below):

Table 2: Universities of Technologies offering Agricultural Education and Training in South Africa.

<table>
<thead>
<tr>
<th>Name</th>
<th>Province</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape Peninsula University of Technology (CPUT)</td>
<td>Western Cape</td>
</tr>
<tr>
<td>Central University of Technology (CUT)</td>
<td>Free State</td>
</tr>
<tr>
<td>Mangosothu Technikon (Mantec)</td>
<td>KwaZulu Natal</td>
</tr>
<tr>
<td>Nelson Mandela Metropolitan University (NMMU)</td>
<td>Eastern Cape</td>
</tr>
<tr>
<td>Tshwane University of Technology (TUT)</td>
<td>Gauteng</td>
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</table>

The Agricultural qualification offered by the above institutions range from certificate at NQF Level 5 to Doctor of Technology at NQF Level 8. All the five institutions have at least one programme in Agricultural management from Diploma level to B Tech level with the exception of TUT whose Agricultural management programmes are offered up to D Tech level.

3.1.3 Agricultural Education and Training at Universities.

There are 10 universities offering Agricultural Education and Training in South Africa. All these universities offer various agricultural programmes with some institutions offering a wide variety of programmes in the Agricultural curricula.

Table 3: Universities offering Agricultural Education and Training in South Africa.

<table>
<thead>
<tr>
<th>Name</th>
<th>Province</th>
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</thead>
<tbody>
<tr>
<td>University of Fort Hare</td>
<td>Eastern Cape</td>
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<tr>
<td>University of North West</td>
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<tr>
<td>University of Free State</td>
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<td>University of KwaZulu Natal</td>
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<tr>
<td>University of Limpopo</td>
<td>Limpopo</td>
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<td>University of Pretoria</td>
<td>Gauteng</td>
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<tr>
<td>University of South Africa</td>
<td>Gauteng</td>
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<tr>
<td>University of Stellenbosch</td>
<td>Western Cape</td>
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<tr>
<td>University of Venda</td>
<td>Limpopo</td>
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<tr>
<td>University of Zululand</td>
<td>KwaZulu Natal</td>
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</tbody>
</table>

There is also one new institute of higher education in Mpumalanga (Mbombela) which serves as administrative hub, coordinating higher education provision in the province through partnership with universities elsewhere. This university started offering agricultural programs in 2014.

Universities in South Africa educate and provide people with high level skills for the labour market. They are dominant producers of new knowledge, they assess and find new
applications for existing knowledge and validate knowledge and values through their curricula. The universities also service the community through Community engagement and graduate community service. Community engagement has been a concept with which the South African higher education system has grappled for more than a decade. The National Plan on Higher Education (DoE, 2001) also recognized community engagement as one of the three core functions of universities, along with research and teaching and learning.

Community engagement, in its various forms – socially responsive research, partnerships with civil society organizations, formal learning programs that engage students in community work as a formal part of their academic programmes and many other formal and informal aspects of academic work has become a part of the work of universities in South Africa. A study commissioned by the Higher Education Quality Committee indicates that many of the community engagement initiatives conducted by universities have been of an ad hoc nature, fragmented and not linked in any way to the academic project.

The universities offering qualifications in agriculture are positioned to use their skills and knowledge base to empower and assist communities in their development ventures. These universities see Community Engagement as a key priority entrenched in their strategic objectives and in their vision-and mission statements. Community Engagement is treated as an integral part of teaching and learning and research. The focus is particularly on areas where the universities have proven competencies that can enhance development and capacity building in identified communities.

Lecturers and students are committed to share their skills and experiences with the communities in and around the universities. Community Engagement is integrated into teaching and learning and into research to enrich the knowledge base. This programme ensures that all undergraduates and post-graduates students have the opportunity to participate in curriculum and research based community engagement as part of their learning experience.

The institutions identify partnerships with communities with specific needs which can be addressed through the expertise of the institutions in the area of teaching and research. This entails leveraging their knowledge and skills to the benefit of communities and improving the teaching and learning for staff and students as a result.

3.2 Education and training needs of farmers and Extensionists in South Africa.
3.2.1 Education and training needs of farmers.

Extension recognizes the rural household and its farm as the basic unit of production. All members of rural households contribute to agricultural activities and household welfare. It therefore seeks to ensure that all members of all types of rural households have access to the extension services they need. This is done by targeting particular activities to meet the needs of particular categories.

An analysis performed by the Agricultural-Sector Education Training Authority (Agri-SETA) in 2010 identified a range of scarce skills in agriculture. At small-scale level, it was found that farmers lacked skills in a host of areas, farm management and
entrepreneurship, resource management and record keeping, financial planning management, marketing, processing and packaging, transport, natural resources management and mechanical and electrical knowledge. In the commercial sector, the critical constraint identified was the poor educational levels of a large proportion of the labour force which demanded a considerable investment in adult basic education and training and other life skills programmes. There is a huge need to upskill workers in farming, agro-processing and downstream development. Agri-SETA also found that commercial farmers needed to improve their management and business and marketing skills, develop more environmentally responsible production and processing systems, raise environmental, health and safety compliance and make more progress towards meeting international trade standards.

3.2.2 Education and training needs of Extensionists in South Africa.

One of the major problems impeding the effectiveness of agricultural services in South Africa is low level of training of large portion of extension staff. Most Extensionists lack the knowledge and skills required to work in the complex and rapidly changing agricultural environment. Consistently unresponsive universities, universities of technologies and colleges rarely offer extension training programmes that address the changing demands of the work environment. Compounding these problems, the academic discipline of agricultural extension in South Africa is marginalized in agricultural universities, universities of technologies and colleges with only a negligible number of credit hours allocated to extension and related modules. The extension modules are totally absent in some of the institutions. It features as an elective in few programmes and as required area of learning in a very small number of qualification. This thus implies that the current agricultural and training system is not producing agricultural graduates that are geared and skilled to work with the majority of farmers in the country within the extension context.

A number of existing Extensionists still need to upgrade their qualifications from their current diploma qualifications to the new requirement of four year degree. The training functions of the Department of Agriculture, Forestry and Fisheries and non-governmental organization (NGOs) generally run ad hoc in-service training programmes that do not prepare Extensionists adequately to deal with complex agricultural problems.

While some of the constraints to attaining the full potential of agricultural performance are known, there has not been an appropriate response in formal education and training curriculum content to address the requirement in areas such as marketing, management, value-adding and other practical skills. The current extension curricula fails considerably short in preparing Extensionists for the critical role as learning facilitators, as catalysts responsible for getting farmers involved in participatory research and technology development, as development agents ensuring that a conducive development systems are created within which the farming venture will operate.

Training is a fundamental feature of the extension approach. All providers of extension services need to be confident in their ability to solve farmers' problems and supply many of their information needs. Training is also necessary to provide Extensionists with the skills necessary to deal with the needs of particular clients, such as women and the landless households. Government policy is for training opportunities to be made
accessible to all extension service providers. The training needs of Extensionists, based on the service requirements of the farmers, will set the training agenda. Education and training is important for effective extension delivery in all aspects of sustainable agriculture and rural development to attain food security, poverty reduction, rural empowerment and environmental management.

The current extension curricula falls considerably short in preparing Extensionists for their critical role as learning facilitators, as catalysts responsible for getting farmers involved in participatory research and technology development as development agents ensuring that a conducive development environment and sustainable development systems are created within which the farming venture will operate. There is marginalization of agricultural extension modules and content in the majority of agricultural qualifications offered at the institutions. Extension modules are totally absent in some of the institutions. Extension features as an elective in few programmes and as a required area of learning in a very small number of qualifications. This thus implies that the current agricultural education systems is not producing agricultural graduates that are geared and skilled to work with the majority of farmers in the country within an extension context.

The retraining and further training of Extensionists are frequently mentioned in the strategic objectives and intervention programs of the Agricultural Education and Training strategy. In the official document “Norms & Standards for Extension and Advisory Services in Agriculture”, it is stated that there is an urgent need to improve the human resources in terms of competences and skills and qualifications and high quality services to the clients. The following additional skills and competences are needed by Extensionists in South Africa: client orientation and customer focus; communication; project management; knowledge management; service delivery orientation; problem solving analysis; people solving management and empowerment. Extensionists need more training in the area of extension program planning, educational process and human development, research and evaluation in extension.

The Department of Agriculture (DoA) Profiling study undertaken by DoA in 2007 established that only modest progress have been made to date towards empowering the existing Extensionists with the above range of skills and that a very big task still lies ahead in this regard. Many Extensionists currently lack professionalism and commitment and that the morale is generally low. The following attributes are essential for success: passion, drive and perseverance, standards of ethical conduct and behaviour. Extensionists require a working knowledge and competencies of various extension methodologies and approaches such as the Participatory approach, the Project approach, Technology Transfer approach.

A particularly big need exists for skills upgrading of Extensionists in agricultural economics, business and financial management and technical and production related skills such as animal production, crop production and horticulture. A similar comment can be made about provincial state vets and agricultural engineers. Government needs to embark on a major national marketing drive to promote the importance of agriculture as a career. Interest in farming as a career seems to have waned over the years, mainly because of uncertainty over the future of farming. The government can invest in land and equipment but there has to be a correspondingly investment in human capacity. There is
therefore a need to get young people into science and engineering degrees, to acquire those skills that are required to get production in rural areas.

Education, skill transfer and development is a crucial issue in the agricultural sector and South Africa as a whole. Any industry that advances does so from the basis of investment in people and technology. There is a need to invest in human capability to build an agricultural sector that will help grow the sector. South Africa has enough researchers but has insufficient specialists. Commodity groups complain about a shortage of agriculturalists and scientists. It is important for the private sector and commodity organizations to earmark young biology students and direct them into specific fields in agriculture. Commodity organizations need to enter into partnership with Department of Agriculture Forestry and Fisheries (DAFF) to upgrade the skills of existing Extensionists.

3.3 The role of Agricultural Education and Training in sustainable agricultural development in South Africa

Food security and its relationship to sustainable agricultural and rural development have increasingly become matters of concern for South Africa. While there are many complex factors that influence sustainable development and food security, it is clear that Agricultural Education and Training (AET) plays an important role in preparing farmers, researchers, educators, extension staff and members of Agribusinesses and others to make productive contributions. However, one of the critical issues in the 21st century is the changes and adaptations required in AET in order for it to effectively contribute to improved food security, sustainable agricultural production, viable agribusiness and rural development.

Agricultural Education and Training institutes in South Africa are formed in the belief that farm production could be increased as a result of the systematic application of current technology and agricultural research findings. The mission of these educational institutions is to scientifically study agriculture with the participation of the farming community, to carry the results to a broad range of farmers who can use then; and to train farmers, extension workers, agricultural teachers and researchers so that agricultural production can continue to be increased on a sustainable basis. These institutions are continuing to play a decisive role in rural development and sustainable agricultural production.

3.4 Challenges facing agricultural education and training in South Africa.

There is poor and inconsistent quality control (variation among institutions) and the ineffective and non-responsive education and training systems (curriculum, poor linkage between Agricultural Education and Training providers and industry and low research base). Underlying these difficulties is the negative career image of agriculture that is painted by society.

Curricula are not relevant to the needs of farmers and to the labour market in general. In the past, the public sector used to absorb the large majority of agricultural graduates. This is no longer the case and agriculture graduates are finding it increasingly difficult to find employment. Government can no longer afford to hire every graduate. Education in agriculture has not been oriented to the needs of an increasingly sophisticated commercial
sector and has not kept up with the increasingly sophisticated labour demands of the private sector.

Agricultural education is expensive. It requires teaching aids and materials, scientific and technical equipment and experimental farms. Agricultural education institutions face great difficulties in ensuring properly equipped, maintained and functioning laboratories and practice farms. It is therefore not surprising that the objectives of experimentation, teaching, outreach are inadequately achieved.

The institutional relationships between agricultural teaching and research and extension services are inadequate. This is the result of the deliberate separation of education, research and extension into different departments and agencies and a lack of functional mechanisms to link them together to solve common problems.

4. CONCLUSIONS

The study concluded that:

- improving human capital in agriculture is important as it fulfils the growing need of skills and expertise of both Extensionists and farmers to exploit the opportunities in the agricultural sector;
- both formal and non-formal education is essential for improving agricultural and rural development;
- academic institutions have a central role to play towards capacity building and therefore Higher agricultural institutions in South Africa are expected to play a leading role in the agricultural training systems;
- South Africa like other countries will not develop without well-educated people with strong agricultural base to provide food security, sustainable agricultural production and economic development. It is necessary to ensure that persons qualifying themselves to labour in the field of agriculture are equipped with the most suitable body of knowledge to ensure optimal performance.

5. RECOMMENDATIONS

The dramatic reduction in employment by Ministry of Agriculture in recent years means that students increasingly need to learn knowledge and skills for private-sector employment. It is also likely that employment outside the agricultural sector will grow at a faster rate than in agriculture. This requires a continuous analysis of job markets and employers’ requirements in order to plan and develop appropriate curricula. Agricultural education institutions need to better relate curricular to employment opportunities. Curricula changes are needed that will prepare students for employment opportunities in the private sector. To adjust training to private-sector employment requires that agricultural education institutions develop ways of keeping in touch with the labour market. By involving potential employers in the curriculum development process will ensure that agricultural education result in gainful employment for graduates.

Extension curricula at Universities, universities of technologies and colleges in South Africa need to be revitalized. The institutions need to be helped to increase their flexibility, develop client-driven training programmes, acquire relevant core instructional
materials, forge partnerships and linkages and mobilize internal resources (both human and financial) to sustain their programmes.

One unique and very important element of curriculum revitalization is Work Integrated Learning (WIL). This is the off-campus experiential learning component of the programmes. After a period of study on campus, students return to their workplace to conduct experiential learning independently or in groups to narrow the gap between theory and practice. This is to immerse students in valuable farmer-focused experience-based learning activities, reduce the discrepancy between training and the tasks the Extensionists perform in their real work environment and avoid the traditional tendency of making the training too theoretical. The essence is to develop the student’s ability to identify problems and explore practical ways to correct them. The emphasis should be on helping learners to be reflective practitioners and to view learning as a process not limited only to outside experts.

In addition to the traditional modules such as adult education, extension methodologies, program planning and evaluation, there are some elements to be included in the curriculum which include critical thinking, oral and written communication skills and understanding of food security and sustainable agriculture, the vital role of women in agriculture, the growing role of private sector in agricultural extension service and the impact of agriculture on the environment.

It is interesting to note that the Academy of Science for South Africa (ASSAF) has constituted a 13 member panel to undertake a consensus study on “Revitalizing Agricultural Education and Training in South Africa” in the year 2013. The panel is investigating the prospects and possibilities for revitalizing Agricultural Education and Training in the South African context from the perspective of research, teaching and learning as well as the agricultural extension service. The study is looking at the challenges facing the sector with the goal of crafting an envisioned future for Agricultural Education and Training in the country. This ASSAF Agricultural Education and Training study is to provide evidence-based information and clear recommendations to the South African government, that is, the Department of Higher Education and Training (DoHET), the Department of Science and Technology (DST) and the Department of Agriculture, Forestry and Fisheries (DAFF) on the way forward towards the emergence of an agricultural human capital development and knowledge system that derives smallholder farmer-led development initiatives and innovation in order to achieve commercial production and increased productivity, food security and economic growth and development.

Serious attention should subsequently be given to the inclusion of appropriate agricultural extension education and training as a compulsory learning component of all agricultural qualifications in the tertiary system.

To establish a strong agricultural sector, there is a need for well-structured training programmes, which are relevant and responsive to the needs of stakeholders. It is critically important to provide capacity building as a support package to ensure that clients are able to manage their farming enterprises in a sustainable manner, through skills development.
New innovative ways of funding institutions need to be explored.

The participation of higher education institutions in research activities needs to be planned as part of the regular activities of the teaching staff and their students. For agricultural education institutions to participate more fully in research, the role of research should be clearly defined in the institutional policies and in the responsibilities of faculty members. As with research, close working relationships between agricultural education institutions and extension systems are indispensable in order to ensure the relevance and contribution of agricultural education.

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THE POTENTIAL EFFECT OF AN EXTENSIONISTS' ATTITUDE TOWARDS STRATEGY ADOPTION AND IMPLEMENTATION IN THE CHANGING AGRICULTURAL ENVIRONMENT IN SOUTH AFRICA.

Sintwa, S. M.13

ABSTRACT

In the changing agricultural sector, the challenge is to develop strategies and approaches for optimum involvement of Extensionists, researchers, development agents, and the eventual users of the technology in the entire process, starting from the identification of a field problem to the actual generation of the possible solution.

Although the success of changes depends on several factors, the human factor is a critical resource in change management. Change must be implemented by employees – change recipients, moreover employees' supportive and creative behaviours (attitudes, beliefs, values) have been considered as the success factors of change.

For this work, Extensionists' attitudes towards change strategies are investigated. Positive attitudes changes were found to be vital in achieving organizational goals and in succeeding change programmes, while negative attitudes appear to be barriers. The Extensionists have a role to play in developing a positive attitude and the leaders have to create conducive environment for that, so that strategy adoption and implementation can be successful.

KEY WORDS: Extensionist, attitude, change, strategy adoption

1. INTRODUCTION

Agricultural extension work is a significant social innovation, an important force in agricultural change, which has been created and recreated, adapted and developed over the centuries (Jones and Gwyn 1994). A number of extension approaches have been developed that were considered particularly relevant to the situation, from “Lord Clarendon’s husbandry instructions” in Europe (Jones and Gwyn 1994), to the modern Project Approach in Southern Africa (Hanyani-Mlambo). However, as with some other developments, these have been found to be inappropriate and ineffective in volatile rural development contexts and had to be replaced.

In the changing agricultural sector, the challenge is to develop strategies and approaches for optimum involvement of Extensionists, researchers, development agents, and the eventual users of the technology in the entire process, starting from the identification of a field problem to the actual generation of the possible solution (Sadighi and Mahammadzadeh 2002:13).

13 Department of Rural Development and Agrarian Reform, Private Bag x 536, Elliotdale, 5070. Tel: 047 577 0042, Mobile: 083 303 8347, Fax: 047 577 0073. Email: simphiwesintwa@webmail.co.za
Although the success of changes depends on several factors, the human factor is a critical resource in change management. Change must be implemented by employees – change recipients, moreover employees' supportive and creative behaviours (attitudes, beliefs, values) have been considered as the success factors of change (Heifetes and Laurie 2001:131). For this work, Extensionists attitude towards change strategies are investigated.

Positive attitudes changes were found to be vital in achieving organizational goals and in succeeding change programmes (Eby et al., 2000). The most important factor behind failure of change initiatives is employees’ resistance to change, which is closely linked with the development of negative attitudes to change. Employee attitudes toward change can impact their morale, productivity and turnover intentions (Eby et al., 2000). This review has indicated that there are positive significant relationships between employee's attitude toward change and employee readiness and also change-oriented leadership style and employee readiness for strategy adoption. (Faghihi and Allameh 12:219).

2. PROBLEM STATEMENT

Attitudes are usually viewed as evaluative tendencies (favourable or unfavourable) towards a person, thing event or a process. An attitude towards a particular object is thus a bias, predisposing a person towards evaluative responses that are positive or negative (Marr, 2002:17). The attitude will affect the person’s thinking, behaviour and even feelings. Faghiini and Allameh further note that an employee’ attitude is a good predictor of change readiness in organization, therefore, for successful change, initially employees' attitudes should be assessed and then prepared for change (2012:218).

In USA, researchers revealed that employees’ emotions about change at work can adversely affect organizational success. In its study on work and human emotion Human Resources consulting giant Towers Perrin found that more than half of the 1,100 North American workers they surveyed had “negative’ emotions about work, while nearly a third had “intensely negative” emotions about their work (Cite HR). The study, which explored employees’ emotional connection to their jobs, noted that workers’ negative emotions adversely affect productivity, profitability, performance and retention, key factors to organizational success. Extensionists are not an exception, and may develop positive or negative attitudes that may or may not be supportive of the introduced change strategies.

According to the Norms and Standards of extension in South Africa, extension and advisory services need a cadre of well-trained, dedicated and motivated staff skilled in agricultural production (scientific and technical expertise), business (economics, marketing and financial management expertise), extension and communication techniques,(DoA). Considering that agricultural extension and advisory services are dynamic professions that constantly change in response to changing policy environment and clientele needs or requirements (Jones and Gwyn 1994), the question is: are our Extension Agents prepared and motivated enough to deal with these changes?

Various changes in the agricultural sector which include change in mandates, leadership (e.g. Democratic Government in SA) and strategies (e.g. Extension Approaches), may
have impact on Extensionists. Some Extensionists, particularly older ones, may find it challenging to deal with those changes and that could lead to demotivation.

For example, South African Social Attitudes reported that some groups, including labour unions have voiced strong opposition to affirmative action and other similar policies in South Africa, arguing that they constitute a form of reverse discrimination against whites, lead to inefficiency and a drop in standards, and re-racialise South African society (2nd report:31). Some Extensionists, for example, find it difficult being led by a female, whom they see as having that position because of transformation policies and therefore not fit enough to be in that position.

Other common examples include: shifting of Extensionist from serving a certain area, which he/she has sentimental attachments to it to serve in another area; top-down approach, though it is necessary sometimes; rewards received by select few and not properly communicated; a shift in political leadership and therefore community development mandates without proper exit strategies; strategic plans which are not properly communicated to have a buy in, and not properly monitored and evaluated. All these examples can result in an attitude (positive or negative) which can have an impact in commitment towards implementing the department’s strategies.

So, firstly, the Extensionists need to ask themselves if they have the right attitude for dealing with this ever changing environment. Secondly, what role can leadership play in trying to create a team with a winning attitude and combat negativity in the workplace so as to ensure that the change strategies are adopted and implemented smoothly by the department’s workforce?

This paper seeks to discuss, by viewing literature, some potential effects of professional Extensionist attitude towards adoption and implementation of strategies in the ever changing agricultural environment. It also points out some recommendations for Extensionists and leaders to better deal with attitude problem.

3. METHODOLOGY

The author has used desktop study in which literature was reviewed and synthesized in order to establish facts about the Extensionist attitude and strategies. The author also uses personal experiences as an Extensionist to support the discussion. This paper discusses the relation between change, attitude and strategy adoption and implementation. It further looks at the role of attitude (negative and positive attitudes) in adoption and implementation of strategies. It also recommends some actions that Extensionists can take in addressing the attitude problem and therefore contributing towards successful strategy implementation. It concludes by recommending what role leadership can play in identifying and managing the attitude problem.

4. FINDINGS
4.1 The relation between change, employee attitude, strategy adoption and implementation.

Change is concerned with solving the problems and challenges of an organization. In the literature it has been defined as breaking down existing structures and creating new ones
In their study of “employee attitudes towards change”, Faghini and Allameh suggested that attitude towards change is based on the model by Dunham et al., (1989) which has been used by Kursunoglu and Tanriogen (2009) in their study on instructional leadership behaviours and its relation to attitude towards change in school organization. Attitude towards change is studied based on three aspects, namely cognitive, affective and behavioural. The Cognitive aspect refers to change views that focuses on the advantages and disadvantages, benefits, requirements and knowledge needed to manage change. The Affective aspects refer to feelings associated with dissatisfaction and concern in making changes. The Behavioural aspect refers to the action taken or to be taken in the future in the face of change or in resisting change (2012:10).

Strategy implementation is an integral component of the strategic management process and is viewed as the process that turns the formulated strategy into a series of actions and then results to ensure that the vision, mission, strategy and strategic objectives of the organisation are successfully achieved as planned (Thompson & Strickland 2003: 365).

It is people who make up organizations and it is they who are the real source of, and vehicle for, implementation of change strategies. They are the ones who will either embrace or resist change. If organization’s need change in order to take hold and succeed, then organizations and the people working in them must be ready for transformation. Readiness for change is not automatic and it cannot be assumed. A failure to assess organizational and individual change readiness may result in spending significant time and energy in wrong direction. An investment in developing change readiness – at both an individual and whole-of-organizational level – can achieve a double benefit (Smith, 2005).

Based on this review, it is believed that Extensionists' attitudes toward change are positively related to their readiness for change and subsequently, the successful adoption and implementation of strategies.

### 4.2 Potential effect of attitude in strategy adoption

#### 4.2.1 Negative attitude

The most important factor behind failure of strategy adoption and implementation is the employees’ resistance to change, which is closely linked with the development of negative attitudes towards change (Eby et al., 2000) Among other factors contributing to negative attitudes, Ilegbaoge (1992; 5) stated that lack of resources, political interference, staff workload and insufficient recognition for hard work.

This correlates with some findings of Jooste and Fourie, (2009:60), who state that major barriers to successful strategy implementation include: strategy not being properly
communicated and therefore not being understood by the employees. Moderate barriers are cited as: The goals of, and incentives for, the workforce are not aligned with the strategy of the organisation. Human capital is not effectively developed to support strategy implementation. There is an inability to manage change effectively. The allocation of resources is not aligned with the strategy of the organisation.

Negative employee attitude emanates itself in the form of absenteeism, incompliance, lack of creativity, blaming others, rudeness, tardiness, dependence and overall laziness. (Mack14:01). Gang & Gang concluded that, employees with negative attitude may be just “hanging on” to their present jobs without being engaged in, or maybe only moderately engaged. Furthermore, employees who are not fully committed may adversely affect co-workers with their negative attitudes (citeHr: 01). All these factors can be a barrier to a successful strategy adoption and implementation.

4.2.2 Positive attitude

An Extensionist’ attitude at work can be favourable, and therefore can impact positively towards the implementation of an organization’ strategies by impacting their morale, productivity and turnover. Positive attitude changes were found to be vital in adopting organizational strategies and in successfully implementing change programmes (Eby et al., 2000). For example, in Nigeria and India, the positive attitude of Extensionists towards Training and Visit approach were found to have played a big part in its successful adoption and implementation (Ileubaoge, 1992).

Scientists have observed that favourable attitude of Extensionist and researchers are essential in order to promote rural development, (Hassan Sadighi 2002, 08). According to AttitudeWorks, “the experience, education and personality can shape the attitude of workers to everything around them”. In his work, Ileubaoge also believes that an organization will succeed in achieving its declared objectives to the extent that its personnel behaves according to its norms, goals and set policies and when the members have set in themselves democratic philosophy (attitude, values and beliefs) which reflect a concern for the development of the people (Ileubaoge, 1992.) Therefore, the relative success of extension can be determined by assessing, in part, the attitude in which the Extensionists hold toward their work.

4.2.3 Effects of positive attitude

According to AttitudeWorks, a positive attitude leads to, among other things: resilience, optimism, confidence, creativity, conflict resolution, emotional intelligence, achievement drives, motivation and focus.

**Resilience** - If an Extensionist views failure as a learning experience, it is easier to bounce back and look for new approaches, rather than blaming him/herself and thinking that the task is too hard or the world is unfair.

**Optimism** - Success, longevity and happiness—which lead to motivated extension force, are all by-products of optimism. With an optimistic attitude, an Extensionist sees him/herself as being able to influence the people towards adoption of strategies and enables him/herself to take risks and accept failure.
Confidence - Confidence stems from optimism. A confident Extensionist believes in his/her own abilities and thinks he/she has the ability to impact the environment. Confidence remains steady during set-backs, because they are seen as merely challenges, and the Extensionist is ready to take new risks.

Creativity - Positive attitudes are at the heart of innovation, because it takes a risk to try something different.

Conflict resolution - Differing attitudes have caused problems or conflict in our personal and professional relationships. Conflict arises because we expect everyone to have the same attitude as ourselves. But, with a positive attitude, an Extensionist can build his/her own empathy and can more readily see how other people think and feel.

Emotional intelligence - Emotional intelligence is considered one of the important traits in transformational leadership. Components of emotional intelligence include self-awareness, self-regulation, motivation, empathy and social skill (Charlton 2002:152). This can enable an Extensionist to better manage and express his/her emotions and understand others.

Achievement drives - The attitude of achievement, i.e. the will to get results, can enable an Extensionist to set challenging goals, take calculated risks and learn how to improve performance.

Motivation - Surveys show that most people’s motivation in their work comes from stimulation and challenge - the chance to learn. Bringing an optimistic attitude to the workplace will create a culture of innovation. The creativity and stimulation of ideas will keep the extension workforce motivated and keen to learn.

Focus - If an Extensionist is focussed, he/she is committed to tasks, will take responsibility for them and will be able to align his/her goals with those of an organization.

5. CONCLUSION AND RECOMMENDATIONS
5.1 Role of an Extensionist in developing a positive attitude

Having reviewed these effects of positive attitude, it can be assumed that the expected role of a professional Extensionist in dealing with attitude would be first to try and adopt a positive can-do attitude. Scientists suggested that extension workers could develop, through continuous training, the attitudinal predisposition necessary for adoption of strategies. In his work about investigating job burnout in extension, Oladele (2009:15) suggested that one of the coping strategies for Extensionists is adopting a positive can-do-attitude at all times.

Secondly, it is clear that, in addition to their technical expertise, extension officers need to be more capacitated in management, leadership and other skills in order to be well equipped in the execution of their duties and assisting government initiated strategies (Mmbengwa et al. 2009;10). They further suggest that through attending regional and
international conferences and workshops, the Extensionists may be capacitated through sharing of experience and current technologies.

Thirdly, employees can also be empowered through organizational learning—defined by Tsang (1997:75) as the learning which occurs in an organisation that produces real or potential change after a shift in the relationship between thought, organisational action and environmental response. This can broaden their knowledge through self-development and understanding the environment around them, and knowing what is expected of them in this change process.

For example, with respect to organizational learning, a strategy was developed in South Africa, by the Department of Agriculture, Forestry and Fisheries (DAFF) in 2007 to revitalise the state of agricultural extension and advisory services in the country (ERP report 2011:vii). Through the ERP fund, a total of 670 officers were registered in 2010/11 to upgrade qualifications and 81 completed their studies, 1 947 officers were trained in skills programmes, personnel were supported with 4 054 ICT equipment. Whether the intended effect of this strategy was achieved or not still needs to be investigated. However, the onus rests with the Extensionists’ attitude and responsibility to ensure that the training and ICT resources received are used effectively.

5.2 Expected role of leadership in creating positive Extensionist attitude

According to 2003 survey by Seek agency, “The quality of Management”, has been cited as why most employees are not happy in the work place. In obtaining its goals and objectives, the organizational success depends on managers and their leadership style (Mosadeghrad et al., 2006:220). Leadership style is defined as a series of managerial attitudes, behaviours, characteristics and skills based on individual and organizational values, leadership interests and reliability of employees in different situations (Mosadeghrad et al., 2006). It is the ability of a leader to influence subordinates to perform at their highest capability. In this light, we can conclude that leadership style has a consistent influence on the organizations’ productivity and profitability especially when changes are required. Although there are several leadership styles and a single style is never ideal for every situation, transformational and charismatic leadership were found to be effective in dealing with change-oriented behaviour (Faghihi and Allameh 12:219).

In trying to change employees’ attitude, the leaders in the agricultural sector need to understand some underlying elements that may create these negative attitudes (Gang & Gang14:02). Amongst other factors, they found that: excessive workload; concerns about leadership effectiveness; anxiety about job security; lack of challenging work and insufficient recognition contribute to negative attitudes. The leaders need to create an enabling environment for the Extensionists to accept change, through participative leadership, employee involvement, coaching and mentoring.

Concerning political change, Charlton notes that politicians provide a broader context in which organizations must conduct their task. The quality of political leadership is therefore a vital ingredient in national growth. However, before judging political leaders, organizations and individuals should realise that they are part of the problem and must get the courage to change themselves (2002:45)
In summing it up, “a key to sustained growth includes the core competence of our continuously enhanced ability to forget the old and invest in our capacity (individual and organizational) to effectively change (effectively judged by all stakeholders in the short and long term)” (Charlton 2002; 08).

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THE IMPORTANCE OF PARTNERSHIPS BETWEEN EDUCATIONAL INSTITUTIONS, NGO’S, COMMUNITY REPRESENTATIVES AND INTENDED END-USERS IN UNDERTAKING THE USER CENTRED DESIGN OF SMALL-SCALE AGRICULTURAL SYSTEM COMPONENTS FOR PEOPLE WITHIN RURAL SOUTH AFRICAN AREAS.

Bolton, M.14.

ABSTRACT

Agricultural extension entails suitable research and development which aids in broadening the blanket of beneficial agricultural knowledge relevant to current and forthcoming circumstances. This paper intends to view this extension from that of an Industrial Design standpoint which entails the designing of usable products intended for mass manufacture. A fitting research project is currently being undertaken at the University of Johannesburg’s Department of Industrial Design, in the development and testing of small-scale agricultural system components relying on passive sub-surface irrigation which suits both hydroponic and conventional growing methods. A suitable design methodology to utilise is that of User Centred Design which includes intended users in as much of the design process as possible, thus maximising the probability of product acceptance and success. This process follows a cyclic pattern of design development, followed by user feedback - repeating as many cycles as is needed resulting in the design being refined to a point where it is suited to manufacture. Logistical and financial implications immediately start becoming apparent due to the fact that the majority of the areas in which there is such a dire need for agricultural development are extremely far removed and hard to access from the areas where the majority of development takes place: sometimes several hundreds of kilometres in areas without paved roads, electricity or cellular coverage. This paper aims to evaluate the process of undertaking User Centred Design process in this manner with regards to important considerations regarding the necessary partnerships required between educational institution, the intended end users, suitable NGO’s and community representatives. Through understanding and defining each role-player’s responsibility in the design process it becomes evident how the forming of these mutually beneficial partnerships allow for the overcoming of logistical and financial hurdles which may seem to obstruct agricultural extension.

1. INTRODUCTION

This paper aims to examine circumstances surrounding a current project which involves the development and suiting of technologies to suit previously un-introduced users. The development of the technologies relates to appropriate small-scale agricultural system components which are intended for rural households, allowing them the opportunity to grow their own fresh produce. This development falls within current design research

14 Lecturer, Department of Industrial Design. Faculty of Art Design and Architecture. University of Johannesburg. E-mail: mbolton@uj.ac.za
being undertaken within the Department of Industrial Design, within the Faculty of Art Design and Architecture at the University of Johannesburg (UJ). Previous community development work undertaken by neighbouring departments of the faculty in HaMakuya, Limpopo province resulted in observations of areas of evident need for the people within these areas, which may possibly be satisfied by appropriate product interventions. Concern among community leaders arose regarding the rapid depletion of trees in the area due for use as firewood. This was brought forward to the Department of Industrial Design within which there is current development being undertaken involving efficient wood-burning stoves which may tackle this problem. This resulted in the beginning of research undertaken by the Department of Industrial Design within HaMakuya. Through assisting with undertaking stove research within the area, it allowed for further identification of possible agricultural concerns within the area. This was further explored through academic literature review and the undertaking of small agricultural experiments in and around the University, in turn feeding more in-depth testing within the rural areas.

The Tshulu Trust, an NGO based in HaMakuya, Limpopo Province, is able to house and facilitate university researchers during field trips at their research facility on the banks of the Mutale River. Tshulu facilities include accommodation, solar and generator power, transportation, and field assistance with translation, data gathering and data capturing. Funding utilised in the undertaking of this project came from the home department and from the Manufacture and Research Centre’s Building Blocks Project, which falls within UJ, Department of Engineering, within the Faculty of Engineering and the Built Environment. Transportation logistics were made possible through the Sustainable Energy Technology and Research (SeTAR) Centre within UJ, which generously granted the use of their 4x4 vehicle for undertaking field work.

2.1 FOOD AND WATER CONCERNS

According to the Food and Agriculture Organization (FAO) of the United Nations, one third of the total population of South Africa are vulnerable to food shortages, the reason for this being the lack of suitable infrastructure in the deep rural areas and not due to insufficient volumes of food being produced, since South Africa is a net food exporter (FAO, 2005:3). It is stated that while home-grown vegetables could alleviate this problem, this is only practised on a small scale because of the small portion of the country that gets enough and reliable rain for successful rain-fed vegetable production (FAO, 2005:3). Households in many of the rural areas still have to travel considerable distances to retrieve water for their household use using plastic containers carried to and from public water collection points. If this water is collected for irrigation purposes, it results in huge amounts of effort to grow fresh produce, possibly being reason enough not to cultivate with collected water.

The South African Department of Rural Development and Land Reform (DRDLR) has undertaken a comprehensive rural development programme in the Limpopo province, which has the ultimate vision of creating vibrant, equitable and sustainable rural communities. This has seen the creation of institutional gardens in four schools in Makhado, and the creation of 100 household gardens in the Mopani District (DRDLR, 2012:1). As there are many more households within the remainder of the Limpopo province, there are many opportunities for creation of household growing systems to allow the people to grow their own food. Worldwide, although there has been a drastic
international improvement in the reducing of food insecurity, there are still almost 900 million people who still suffer from undernourishment and around 2 billion people suffering from negative health consequences of micronutrient deficiencies (FAO, 2012:4). This, coupled with the growing world population which is estimated to reach nine billion by 2050, would result in unprecedented water demands to satisfy the requirements of all of the people. In agriculture this might involve reducing the consumptive use of water by minimising evaporation and transpiration (FAO, 2008:20).

2.2 APPROPRIATE TECHNOLOGIES FOR ECONOMIC WATER USE

With water efficiency of agricultural systems being such an important consideration for the future of food security, there will always be a drive to increase water efficiency of agricultural systems, both large and small. Conventional soil-based cultivation systems are not water efficient mainly due to loss by excessive irrigation, percolation, and evaporation, thus the use of soilless culture may be an alternative to soil-based cultivation (Albaho et al., 2008:1). Soilless culture falls within the family of agricultural practices of hydroponics, which the Merriam-Webster Dictionary (2014) states as the cultivation of plants in nutrient-enriched water, with or without the mechanical support of an inert medium such as sand or gravel. There are several advantages and disadvantages of this method of agriculture, the most suitable to small-scale growing being:

Advantages of hydroponics
- No soil is needed, therefore it can be used in areas irrespective of soil quality.
- The water stays in the system, increasing water efficiency and limiting water loss.
- It is possible to control the nutrition levels in their entirety - lowering nutrition costs.
- No nutrition pollution is released into the environment due to the system being contained.
- Stable and high yields.
- Pests and diseases are easier to control.

Disadvantages of hydroponics
- Higher initial costs compared to growing in existing soil.
- Careful monitoring of nutrients needs to be undertaken.
- Different types of plants require different nutrients and growing conditions.

(Department of Agriculture, Forestry and Fisheries. 2011:6.)

From the advantages listed above, there is immediate merit in attempting to develop or adapt agricultural technologies to suit the people who may benefit from them. The disadvantages should not form barriers preventing the progression of these technologies, but should rather be carefully considered and resolved through system adaptations and developments. Generally hydroponics is considered to be extremely technical, difficult to use, and expensive (Benton, 2004:23). All of these areas can be tackled through developing the system components to better suit usability, cost and manufacture.

3.1 THE INDUSTRIAL DESIGN PROCESS

The Industrial Design process is a creative and inventive process concerned with the synthesis of such instrumental factors as engineering, technology, materials and aesthetics into machine-producible solutions that balance all user needs and desires.
within technical and social constraints (Fiell & Fiell, 2006:6). This involves a systematic process initially starting with an identified need or evident requirement, which proceeds with conceptual ideation of solutions are then explored through design sketching, model-making, prototyping and assessment and refinement of these prototypes. The purpose of this being the identification of suitable direction, and eliminate unviable options.

As the products are developed to suit intended users, logically it makes sense to explore and identify the requirements of these users. A suitable design methodology which allows for this would be User Centred Design, which includes intended users in as much of the design process as possible, thus maximising the probability of product acceptance and success. Designing meaningful and innovative solutions that serves the intended users begins with understanding their needs, hopes and aspirations for the future, and following qualitative research methods allows for the designer/design team to develop deep empathy for people for whom they are designing (IDEO, 2011:41). This process is then followed with developing suitable solutions around these user specific requirements (figure 1).

Once a design is at a point where it can be physical tested and prototyped into a usable item, this can be provided to intended users to offer them the opportunity to provide personal insight into their opinion regarding various aspects of desirability, feasibility, viability, personal preference, usability and functionality (IDEO, 2011:7). This qualitative data should be documented and inform further development and refinement. Failure to effectively satisfy user requirements may result in these users refusing to accept or adopt the newly developed product. When the designers understand the people they are designing for it allows for the design outcome to best suit these people (IDEO, 2011:58). It is important to strive for a suitable outcome, through allowing this process to be iterative, involving design refinements followed by qualitative feedback, which informs further refinement, until the design outcomes have reached a point where it suits the intended users, is able to be manufactured through utilising appropriate methods and materials and is able to be distributed at a suitable price point (figure 2). At this point the product is at a point suiting manufacture, distribution / implementation.
Figure 2. Outcome must suit all 3 areas: User, Technology and Manufacture.

Rushing this process and failing to adequately satisfy all three areas may result in complete product failure (figure 2), and for this reason the process is not to be rushed, and should take as long as is necessary to yield a suitable outcome. If the design outcome does not fit well with all areas: user, technology and manufacture, it invites a high likelihood of product failure.

3.2 ROLE PLAYERS ASSISTING IN THE RESEARCH PROCESS

Undertaking this research and development would not have been possible without the assistance from the various role players which have assisted with financial and logistical aspects of the project. The role players have been listed in Table 1 illustrating the overall strategic objective of each, in conjunction with how each has assisted.

<table>
<thead>
<tr>
<th>Role Player</th>
<th>Strategic Thrust</th>
<th>Assistance in project</th>
</tr>
</thead>
<tbody>
<tr>
<td>UJ Department of Industrial Design</td>
<td>Design for Development.</td>
<td>Home department where research is undertaken.</td>
</tr>
<tr>
<td>UJ Manufacture and Research Centre. Building Blocks Project</td>
<td>Open Community Manufacturing: Open Design &amp; Distributed Manufacturing.</td>
<td>Funding to cover prototype development and field research.</td>
</tr>
<tr>
<td>UJ Sustainable Energy Technology and Research (SeTAR) Centre</td>
<td>Sustainable Energy Technology and Research.</td>
<td>Vehicle support for undertaking field research.</td>
</tr>
<tr>
<td>Tshulu Trust</td>
<td>Sustainable Rural Development.</td>
<td>All aspects linked to field research. Accommodation, field transport, translation, data capturing.</td>
</tr>
</tbody>
</table>

What becomes evident in the strategic thrusts of the different role players is the general thread towards Community, Development and Sustainability. The partnerships created throughout the undertaking of a project of this manner allow for each party to further progress their own strategic drives, in illustrating their involvement in sustainability, community development, manufacture etc. This assists in remaining focussed on their strategic thrusts and allows for future grant and funding applications, and attracting
investors. The UJ Manufacture and Research Centre, which has received funding from the Department of Science and Technology, has financially supported the undertaking of this research. Through illustrating and documenting commitment into supporting agricultural small-scale design for development projects it may allow for attracting of future funding from other avenues. The SeTAR centre allowed for the use of their vehicle for the journey to the research area. Possible future prototype manufacture of field implementation assistance may be offered by the Department of Industrial Design to the SeTAR centre to illustrate mutual commitment to each other’s strategic thrusts. All research authorship lies with the researcher, and all intellectual property created also lies within the Department of Industrial Design, illustrating that these outcomes were not utilised as bargaining chips for attempting to receive logistical or financial assistance.

4.1 LOGISTICAL IMPLICATIONS OF UNDERTAKING USER CENTRED DESIGN

As the abovementioned User Centred Design process ideally includes user involvement in many steps throughout the development process of the product, this creates a problem if the intended users are far away from the design facilities. The distance between the UJ and HaMakuya is approximately 600 km, which due to the quality of the roads, takes a day and a half of travelling to complete. The department of Industrial Design houses a comprehensive workshop which houses many different types of machinery capable of creating models, prototypes and batch manufacture of items from wood, metal and plastic. Furthermore, CNC\textsuperscript{15} machinery allows for laser-cutting and CNC milling of various material types. The UJ design studios house highly capable computers, with Computer Aided Design (CAD) software packages and high-speed internet. Lastly the manufacturing sector within Johannesburg’s limits allows for outsourcing of many different types of manufacture, allowing for effective design development facilities and prototype batch manufacture to be within reach of students, staff and researchers within the University.

![Figure 3. Distance between design facilities and intended users. Adapted from Google Maps 2014.](image)

\textsuperscript{15}CNC, or Computer Numerical Control involves the operation of machinery, based on computer inputs. This allows for the manufacture of items to be determined by computer designs. This results in highly accurate and reproducible items.
The circumstances within HaMakuya is opposite, with problems at times with cellular coverage (for data, internet and voice calls), electricity provided by diesel generators during designated times and no paved roads. The undertaking of manufacture and assembly needs to be carefully planned as all computers; tools; hardware and equipment required in the field needs to be transported from UJ in a suitable vehicle. As the department of Industrial Design does not possess its own vehicle, and vehicles within the UJ vehicle fleet does not include 4x4 capable vehicles, a suitable vehicle needs to be sourced and organised as part of this preparation.

4.2 FIELD RESEARCH

Field research and community engagement in HaMakuya is made possible by the availability of resources and facilities at the Tshulu Camp, run by the Tshulu Trust. The Tshulu trust aims to achieve sustainable livelihoods by improving the ability of community members to utilise their natural and cultural resources in an optimal and sustainable manner (Tshulu Trust, 2013). Tshulu supports community members through salaries and any profits earned through the undertaking of eco-tourism within the area. This relationship allows for the undertaking of research within the area, as previous agreements and discussions have already taken place between the NGO, and the rural chieftancy within the area. The Department of Industrial Design pays for all of these services, as the undertaking of research of this manner in the remote rural areas would otherwise be impossible without this access to the field.

The separation of the design process into defined steps needs to be undertaken, allowing for careful planning as to what needs to be accomplished at each step of the design process and what resources, hardware, and data gathering tools are required.

For the undertaking of this project, field trips are undertaken at approximately 6 month intervals, with each trip spanning approximately one week. Upon returning to the equipped design facilities, the analysis of observations and gathered data can be undertaken and applied to technical and experimental development. The 6 months wait prior to the following field trip allows for the testing models within the UJ university facilities to observe plant growth and undertaking further literature surveys, developmental model fabrication and preparation for the next field trip. This time span may be considered to be excessive and prolong the design process unnecessarily, however the longer a user is able to use and engage with a product, the more viable the data at the end of this process. For agricultural components, this makes sense to provide users with the designed components and allow them to utilise it for an entire growing season, after which they contribute further data. User feedback spanning an entire season of use would allow for almost instantaneous observation as to whether or not they are happy with this new product or system. This systematic cycle allows for users to engage with prototypes and provide feedback on a regular basis, and allows for the researchers to plan the logistics and financial, transport, support required for proceeding trips, without drastically impacting the university lecturing schedule of academic course-work and available research budget.
4.3 RESEARCH FINDINGS INFORM ONGOING PRODUCT DEVELOPMENT

The first field trip to the rural area was undertaken in April 2013. The purpose of this trip was to begin observing circumstances within the area, and begin identifying possible intervention approaches. This was a combination research trip where the researcher was accompanying a colleague in assisting with the field implementation of efficient wood burning stoves. The researcher’s contribution to the stove research was that of fabrication, assembly, field assistance, and in turn having the opportunity to undertake initial field observations regarding agricultural aspects. Upon returning to the university facilities in April 2013, observational data allowed for the start of testing small hydroponic systems which may possibly suit the area. A suitable hydroponic technique for ease of user acceptance was identified to be that of Passive Sub-Surface Hydroponics which relies on a soilless growing medium comprising Coir and Perlite (or any suitable inert wicking medium) to allow for root anchorage, and nutrient wicking. This can be contained in suitable containers which would allow for nutrient solution retention and limiting evaporation. This type of system does not rely on any power sources, moving parts or intricate valves, making it seem to be the most user friendly option to begin with. Several different types of researched system configurations were tested at the university and the researchers home (figure 4), slowly allowing for the learning and adapting of the systems into what may be considered more user friendly, low cost and functionally able to grow fresh produce effectively.

![Figure 4. Experimental testing of different hydroponic systems.](image)

After approximately 6 months of experimental prototype testing, a system configuration was at a point where it would be viable to attempt to hand it over to representatives at the Tshulu Trust. This incorporated standard components, and comprised a bucket with an incorporated reservoir, with filling of the reservoir made possible via a filling tube. Growing medium afforded wicking upwards of the nutrient solution via the incorporated wicking chamber, this is illustrated in Figure 5.
The implementation of prototypes of this sort was undertaken in October 2013, during a field trip which was concerned with pilot prototype training and implementation as well as pilot questionnaire runs. In figure 6, a Tshulu representative receives one of two hydroponic test sets (4 of the 7 total growing containers).

The undertaking of pilot questionnaires allowed for refining a questionnaire which would later allow for gathering user specific qualitative data regarding patterns of purchasing and growing of fresh produce within the rural areas. This was refined through working with translators and pilot participants. After completion of this research trip, the Tshulu field assistants would later that month complete 110 questionnaires and these questionnaires would be translated, captured, and digitally sent to the university. These questionnaires were completed and captured into digital format in November 2013. Due to computer connectivity issues within the area and problems with computer viruses, it has taken till February 2014 to receive these questionnaires. Of the 110 initially intended to be captured; only 86 were able to be retrieved. These are currently being statistically analysed for trends which will be utilised in the next step of the design process which would be the batch implementation of test prototypes in rural households. These data may possibly possible component manipulation to better suit the users, in particular the component suiting to preferred types of fresh produce.
Figure 7. University porch serves as prototype testing platform: prototypes operate effectively and are ready for field batch testing.

The intention is to finalise an implementation ten sets, each comprising of three growing containers to be provided to households in the next field trip (30 growing containers total). Half of these systems will rely on hydroponic nutrients for feeding the plants. The other half of the systems will serve as control systems which will include standard potting soil mixed with a suitable wicking material allowing for similar wicking action as the hydroponic sets. Both of these system types will be comprised of the same hardware, allowing for comparisons between the two to be drawn up. Once these have been used by the intended users for a considerable amount of time, and the results are promising, then design finalisation can be undertaken and consideration for distribution within the rural areas.

4.4 PROBLEMS ENCOUNTERED

Since the last field trip which was undertaken in October 2013, several drastic management changes have taken place within the Tshulu Trust, which may possible effect the future of this ongoing design development. Furthermore, the current available funding within the university department for undertaking field research is only able to cover one or two more field trips, after which the future funding is still to be acquired; this is not including the costs implications of manufacturing test prototypes and purchasing of materials. Logistical implications are an ongoing concern, availability of vehicles, transport and field assistance, management of valuable data, all of which may prevent the undertaking of field visits.

5 CONCLUSION

The process of undertaking research with intended users with the aim of better informing product design is a process that should not be rushed, and each design decision should be carefully considered and justified. Through seeking, incorporating and receiving assistance from various sources, both financially and logistically allows for the iterative process of User Centred Design in remote areas. Each party involved is able to illustrate
its participation in striving to undertake effective development and sustainability through assisting other role players with similar objectives.

The outcome of this agricultural research is intended to be a system comprising multiple components, able to allow people within the rural areas to grow fresh produce in an easier manner due to the water economic attributes of the appropriate hydroponic system. Although this is a product intended for implementation and distribution, there is immense value in the field research methodology of developing suitable and acceptable products for the intended users. Due to the nature of this process, the outcome is not yet cast in stone, but is rather moulded in an ongoing process of development, slowly removing areas of unsuitability and what previously may have been considered to form barriers eliminating the technology for possible inclusion for rural small-scale use.

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TRAINING OF FARMERS AND EXTENSIONIST TOWARDS SUSTAINABLE AGRICULTURAL DEVELOPMENT (THE CASE OF TOMPI SELEKA).

Tshwana, M. P. 16

Abstract

This paper discusses the concept of education and training and its role in a multidisciplinary sustainable agriculture in Limpopo province. The Department of Agriculture developed the Agricultural Education and Training (AET) Strategy in attempt to improve agricultural production through the rendering of quality agricultural education and training (Department of Agriculture Forestry and Fisheries 2005:8). According to Asiabaka (2002:5), education and training builds knowledge and capacity among farmers and extensionist to enable them diagnose their problems, identify solutions and develop plans and implement them with a little support from outside after thoroughly initiated. According to Rogers, (1996:86), “poor training of agricultural extension staff has been identified as part of the problem of the relative ineffectiveness of much of extension in the field.” The paper suggests that a multidisciplinary education and training will not only aim at technology development but will also seek ways of stakeholder participation to ensure a sustainable agricultural development and dissemination. A descriptive research design was used to collect data (Boone et al, 2007:1). It concludes that a well capacitated extensionist will not only increase agricultural productivity; but also lead to sustainable agricultural development through a joint effort with farmers.

1. INTRODUCTION

Education is an essential tool for achieving sustainability. People around the world recognize that current economic development trends are not sustainable and that public awareness, education, and training are key to moving society towards sustainability. Beyond that, there is little agreement. People argue about the meaning of sustainable development and whether or not it is attainable. According to World Commission on Environment and Development, (1987:43), “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.

An important distinction is the difference between education about sustainable development. The first is the awareness lesson or theoretical discussion. The second is the use of education as a tool to achieve sustainability. Education encompasses teaching and learning specific skills, imparting of knowledge, positive judgment and well developed wisdom. It has one of its fundamental aspects of imparting culture from generation. It is an application of pedagogy, a body of theoretical and applied research related to teaching and learning.

16 Tompi Seleka College of Agriculture Private Bag × 9619, Marble Hall 0450. Cell: 071 249 0259. Tel: 013 268 9300 Fax: 013 268 9305 Email: tshwanamodisephelemon@yahoo.com
2. THE EXTENSION OFFICER EDUCATION AND TRAINING NEEDS AND CURRICULUM RESPONSIVENESS

To this end the ideal knowledge and skills repertoire needed by extension personnel to undertake their roles and functions in a competent manner should be established. According to Department of Agriculture Forestry and Fisheries, (2008:vi). At the end they must be compared to the qualification and skills profile of Extensionists currently in the system; and the extent to which current curriculum on offer at the various AET provider Institutions address such needs. Existing extension qualifications still follow the traditional approach and philosophy of extension where the focus is on production related knowledge and skills, technology transfer and negotiations/persuasion and subsequent behavioural change to adapt and implement new technology.

2.1 CHANGES IN CURRICULAR CONTENT AND EMPHASSES

Although agriculture generally kept up with scientific progress in the past, the pace of change is much faster today, requiring continual updating of curricula. Scientific knowledge is changing very quickly as modern communication technologies facilitate the global sharing of information among scientists and educators. Since "new" knowledge becomes "old" knowledge so quickly, it is essential that extension officers develop the skills and attitudes that will allow them to continue to learn and develop their competencies throughout their professional lives.

Access or lack of access to the Internet will determine if the information gap is reduced, or if it will widen even further. If institutions are to keep pace with rapid changes in science and technology, continuing education for faculty members is necessary through scientific meetings and inter-institutional exchanges, including those that apply innovative uses of electronic information systems (e.g., electronic networks for collaborative curriculum development and distance education). A commitment must be made by institutions to improve the information infrastructure to ensure extension officers have access to the new information technologies (Richardson, 1997).

3. METHODS

3.1 Study site

The study was conducted in Tompi Seleka College of Agriculture which is situated in Ephraim Mogale Local Municipality of the Sekhukhune district in Limpopo Province. The College Regae 24 40 22 S and 29 27 04 48 E which is situated 35 km north of the town of Marble Hall alongside Olifants next to Flag Boshielo Dam previously known as the Arabie Dam. The climate at Sekhukhune can best be described as hot and dry. Incidences of frost during winter are rare and during summer the maximum temperature often exceeds 30°C. Rain fall predominantly from October to March and the annual rain fall typically varies between 350mm to 500mm (Anteneh et al 2004:13). Figure 3.1, below present the map of Sekhukhune district where Tompi Seleka College is situated.
According to Acocks (1988:49) the Tompi Seleka College of Agriculture area falls under mixed bushveld type that covers some 10950 square km at an elevation of 750-1050 m and receives a rainfall of 350-650 mm. The bush consists of *Combretum apiculatum* and small admixture of several other bushes and trees such as *Acacia caffra*, *Dichrostachus cinerea* and *Lannea discolor*.

### 3.2. Study approach

Multiple sources of data collection were used: documents review, structured questionnaires and focus group discussion. Eighty (80) participants from a total number of 300 from different municipalities were interviewed. The participatory and development process was controlled by participants. During this process, information that was used for decision making was mostly generated, analysed and interpreted during meetings and was largely based on the perceptions, experiences and opinions of participants. According to Tshwana *et al* (2011:25), the function of the researcher in this process is restricted to that of facilitator, documenter and provider of information.

### 4. RESULTS

This section presents the results of the study. The first part will be the information collected from Extensionists. The second part deals with trainings offered to both Extensionist and farmers. The section is concluded with a brief overview of how Tompi Seleka College managed to help farmers on projects sustainability.
FIGURE 4.1 below presents the perceptions of the extensionists after receiving training from Tompi Seleka College of Agriculture (n=80).

Of the eighty interviewed participants, 30(37.5%) said that they like the trainings that are offered in Tompi Seleka College of Agriculture. In emphasizing the importance of the trainings, 18(22.5%) participants also stressed that there is the element of positive impact as achievements from the offered trainings. Although 11(13.75) are saying that the offerings are relevant to their everyday work activities, some feel that there is a need for curriculum change that will also be relevant to the practicals to be offered. The overall perceptions of the extensionists is that the college offerings should be always need based and relevant to the current situation.

FIGURE 4.1: Perceptions of the Extensionists on the training offered by Tompi Seleka College of Agriculture in 2012/13 academic year

FIGURE 4.2 below presents trained Extensionists and farmers (n=80)
FIGURE 4.2: Extensionists and farmers trained in Tompi Seleka College of Agriculture in 2012/13 academic year

Project management has been identified during interviews for both Extensionists and farmers with 18(22%) as important for sustainable project sustainability. Computer applications have been regarded as the second prioritized elements in training with 16(20%). According to (Moran, 2003: 29) colleges of agriculture must be able to influence extension officers to become heavy users of technology. Communication has been identified as the key to project management and sustainability by both farmers and Extensionists. Ray (2001:25) suggests that extension curricula should focus on identification of core courses in the colleges which will include the level of teaching and credit hours. Therefore there is a need to recognize current curricula in the colleges of agriculture in South Africa with an interdisciplinary focus.

FIGURE 4.3 below presents the perceptions of the farmers after receiving training from Tompi Seleka College of Agriculture (n=80)
Ownership and control has cited by 40(50%) of the interviewed farmers as good interventions made by the college. Unlike during the start of the projects, where there were clear direction, 20(25%) announced that there is sustainability in the projects. These is made possible through the aftercare interventions and inter projects management by different stakeholders including a farmer to farmer interactions.

5. CONCLUSIONS

According to Rogers, (1996:86) "poor training of agricultural extension staff has been identified as part of the problem of the relative ineffectiveness of much of extension in the field." This applies not only to extension staff, but to agricultural professionals in general. Unfortunately, the training of human resources in agriculture is often not a high priority in the development plans of countries. As a result, curricula and teaching programmes are not particularly relevant to the production needs and employment demands of the agricultural sector. Agricultural education curricula need to be redirected to address the labor demands of the private sector. Curricular reorientation will need to incorporate both the new role of market-oriented agriculture as well as issues of direct relevance to food security and rural poverty. Curricula also will need to better reflect the importance of social and environmental issues for sustainable agricultural development. Meaningful curricular revisions will require a better understanding and incorporation of the underlying psychological processes that influence learning.

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ON DEVELOPING COMPETENCY PROFILES FOR PROFESSIONAL SCIENTISTS – A GENERIC FRAMEWORK.

Becker, R. W..\textsuperscript{17},

\textsuperscript{17} Executive Director, South African Council for Natural Scientific Professions (SACNASP) Email: rbecker@geoscience.org.za

THIS PRESENTATION IN MS POWERPOINT FORMAT IS INCLUDED IN A SEPARATE FOLDER ON THE CD. THE FOLDER'S NAME IS: CONFERENCE 2014 - POWERPOINT PRESENTATIONS.
ROLE OF EXTENSION IN SUSTAINABLE AGRICULTURE AND ITS POLICY IMPLICATIONS.

Zondo, B. H.\textsuperscript{18}

1. INTRODUCTION AND BACKGROUND

1.1 Introduction

GCAE (1990) noted that there is insufficient fund to provide adequate coverage of SARD for all groups of farmers especially resource – poor subsistent ones, women and youths in developing countries. There is need for substantial public funding of agricultural extension (AE) because of the benefits accruable. The general impression is that extension is expensive and wasteful; the criticism of T & V but huge investment will be required to develop a country with over 70% involved in agriculture and who are rural based to attain broad based development. Contado (1997) suggests that ways to improve efficiency and reduce cost of public extension should be explored by stakeholders. This could be through encouraging group approach, but not neglecting individual contacts, use of mass media channel. Cost sharing by the 3 tiers of government, support from development partners, the private sector, NGOs and farmers organizations could be fixed as obtains in donor supported programmes. This study deals with role of extension in sustainable agriculture and its policy implications. National policy in extension and advisory services in South Africa is being analyzed. The report will be structured as follows:

- Introduction;
- Project background;
- Purpose and objectives of study;
- Literature study;
- Methodology;
- Results;
- Conclusion; and
- Implications.

1.2 Background

Agriculture is important to the South African economy as it engages about 70% of the labour force and contributes over 40% of the Gross Domestic product (GDP) DAFF (2005). It provides food for the teeming population and raw materials for industries. The sector is faced with mirage of problems which militate against optimizing its potential. Some of the constraints include low productivity, poor marketing and distribution infrastructures, and inadequate access to credit, weak extension services and inadequate database among others. An attempt to ameliorate the constraints by the Central Government was the adoption of the New Agricultural Policy for South Africa in 1995. The New Agricultural Policy (1995) provided the framework for implementation of programmes and guidelines for agricultural development. The broad objective was to attain self sustaining growth in all the sub-sectors of agriculture and realization of the

\textsuperscript{18} Department of Agriculture, Environmental Affairs and Rural Development, Private Bag X 527, Umnzimkulu, 3297. Tel: 039 2590104. zondob@hotmail.com
structural transformation relevant for overall socio-economic development of rural areas (DAFF, 1994). This was expanded in the revised policy to include promoting farmer friendly Agricultural Policy that achieves food security, eradicates poverty, develops the rural economy and protects the environment (DAFF, 2005).

The objectives and strategies to achieve them as spelt out in the policy documents emphasize the importance of agricultural extension to the goal attainment of the agricultural sector. To achieve increased production and improved processing in all the sub-sectors of agriculture (crop, livestock, Forestry and Fisheries), improvement of quality of life and promotion of environment friendly practices and other objectives require extension effort.

2. PURPOSE AND OBJECTIVES OF STUDY

Purpose of study is to achieve a well organized extension system for efficient and effective extension delivery in all aspects of sustainable agriculture and rural development towards the attainment of food security, poverty reduction, and rural empowerment and environment management. Objectives are as follows:

(i) Farmer driven and environment friendly extension;
(ii) The use of appropriate extension approach and methodologies;
(iii) Decentralization of the extension system and activities;
(iv) Extension support to all categories of farmers;
(v) Efficient and effective extension service delivery system;
(vi) Adequate training in the Agricultural Extension personnel is expected to achieve the stated goal; and
(vii) Sustained funding of agricultural extension delivery.

3. RESEARCH METHODOLOGY

Content validity was established by an interviewer. To help control measurement error, the instrument was pilot tested and field tested using 16 professional Extensionists. Test-re-test reliability (1 month) was assessed. Reliability coefficients met criteria (Nunnally, 1967) established for reliability. A five point Likert-type scale was used to measure the level of interest in incorporating a local dimension into future Extension efforts. Fifteen barriers were identified through a review of literature and interviews with professional Extensionists. The questionnaire and a personalized cover letter were distributed to professional Extensionists. Questionnaires were coded to identify early and late respondents. Non-response error as assessed using late respondents as a surrogate for non-respondents (Miller & Smith, 1983). Using a t-test at the .05 alpha level, no significant differences were found between early (n = 20) and late respondents (n = 15) on the domains of interest.

4. LITERATURE STUDY

4.1 Emerging challenges for sustainable agriculture

These external inputs have, however, substituted for natural processes and resources, rendering them less powerful. Pesticides have replaced biological, cultural, and mechanical methods for controlling pests, weeds, and diseases; inorganic fertilizers have substituted for livestock manures, composts, and nitrogen-fixing crops; information for
management decisions comes from input suppliers, researchers, and Extensionists rather than from local sources; and fossil fuels have substituted for locally generated energy sources. The basic challenge for sustainable agriculture is to make better use of these internal resources. This can be done by minimizing the external inputs used, by regenerating internal resources more effectively, or by combinations of both.

. The best evidence comes from countries of Africa, Asia, and Latin America, where the concern is to increase food production in the areas where farming has been largely untouched by the modern packages of externally supplied technologies. In these complex and remote lands, some farmers and communities adopting regenerative technologies have substantially improved agricultural yields, often using only few or no external inputs (Bunch, 1991; GTZ, 1992; UNDP, 1992; Lobo & Kochendörfer-Lucius, 1992; Krishna, 1993; Shah, 1994; SWCB, 1994; Pretty, 1995).

4.2 Sustainability and levels of action

Simple extension of the message that sustainable agriculture can match conventional agriculture for profits, as well as produce extra benefits for society as a whole. The definition of Sustainability then becomes part of the problem because people need to agree on how they define Sustainability and what priority they will give it (Pretty, 1994b).

4.3 Resource-conserving technology development transfer

Many productive and sustainable systems, needing few or no external inputs, have been developed. They stop erosion, produce food and wood, and can be cropped over long periods. But the problem is that very few, if any, farmers have adopted these alley cropping systems as designed. Despite millions of dollars of research expenditure over many years, systems that have been produced are suitable only for research stations.

4.4 Incorporating farmer experimentation

The problem with agricultural science and extension is that it has poorly understood the nature of "indigenous" and rural people's knowledge. For many, what rural people know is assumed to be "primitive," "unscientific," or overtaken by development, and so formal research and extension must "transform" what they know so as to "develop" them. (Chambers, Pacey, & Thrupp, 1989; Röling & Engel, 1989; Warren, 1991; Long & Long, 1992; Scoones & Thompson, 1994). Participatory technology development (PTD) is the process in which the knowledge and research capacities of farmers are joined with those of scientific institutions, whilst at the same time strengthening local capacities to experiment and innovate (Jiggins & De Zeeuw, 1992; Reijntjes, Haverkort, & Waters-Bayer, 1992; Haverkort, van der Kamp, & Waters-Bayer, 1991). Farmers are encouraged to generate and evaluate indigenous technologies and to choose and adapt external ones on the basis of their own knowledge and value systems.
4.5 From teaching to learning and a whole new professionalism

The central principle of sustainable agriculture is that it must enshrine new ways of learning about the world. But learning should not be confused with teaching.

Teaching implies the transfer of knowledge from someone who knows to someone who does not know. Teaching is the normal mode of educational curricula and is also central to many organizational structures (Ison, 1990; Argyris, Putnam, & Smith, 1985; Russell & Ison, 1991; Bawden, 1992, 1994; Pretty & Chambers, 1993). Universities and other professional institutions reinforce the teaching paradigm by giving the impression that they are custodians of knowledge which can be dispensed or given (usually by lecture) to a recipient (a student).

What becomes important is the social transition, or new learning path, that farmers and communities must take to support sustainable agriculture. This is much less obvious and often remains unrecognized by Extensionists. Learning for sustainable agriculture involves a transformation in the fundamental objectives, strategies, theories, risk perceptions, skills, labour organization, and professionalism of farming.

A move from a teaching to a learning style has profound implications for agricultural development institutions. The focus is less on what we learn, and more on how we learn and with whom.

4.6 From directive to participatory extension

Extension has long been grounded in the diffusion model of agricultural development, in which technologies are passed from research scientists via Extensionists to farmers (Rogers, 1962, 1983). This approach is exemplified by the training and visit (T&V), 1989). It was designed to be a management system for energizing extension staff, turning desk-bound, poorly motivated field staff into effective extension agents. Extension agents receive regular training to enhance their technical skills, which they then hope will pass to all farmers through regular communication with small numbers of selected contact farmers.

4.7 Agricultural Extension Policy

Government has responsibility for policy formulation, promulgation of regulations and initiation of programmes. The importance of AEP was recognized by FAO’s Global Consultation on Agricultural Extension (GCAE), Swanson (1990) in Contado (1997). It recommended that all national governments should develop and periodically review their agricultural extension policy. This policy should include the goals of agricultural extension, the responsible agencies and personnel, the clientele to be served, the broad programmatic areas to be addressed and other relevant guidelines.” Furthermore, that “the FAO in cooperation with the donor community, should engage in policy dialogue with national governments to stress the importance of agricultural extension in national agricultural development and the need to have an explicit, formally enacted, agricultural extension policy.
4.8 Issues for consideration in the proposed policy.

(i) Goal of Extension and Advisory Services Policy:
The goal of the Agricultural Extension Policy must align with that of the Agricultural policy.

(ii) Subject Matter Coverage
Extension advice will be provided on all aspects of agriculture and environment (crops, livestock, fisheries, agro-forestry, post harvest enterprises and sustainable agricultural practices) and cross cutting issues such as nutrition and HIV/AIDS as well as malaria prevention, environment friendly practices e.g. (IPM), indigenous knowledge technologies (IKTs). Needs of different clientele categories, gender, resource ownership, vulnerability will be taken into consideration. In essence, farmers’ problems will dictate extension agenda and local resources will be utilized.

(iii) Extension Approach and Functions
Extension needs to go beyond technology transfer to developing skills and knowledge of farm families for sustainable agriculture and rural development. There should be paradigm shift from the Training and Visit (T&V) which involves technology transfer and emphasizes individual contact to more participatory approach. There will be the need to adopt group approach to ensure effective use of limited resources; personnel, time and fund. The approach will ensure participation, ownership, inclusion and empowerment. More farmers will be reached and all gender categories could be catered for through participatory extension approach.

Variety of extension methods will need to be used. Selection and use of appropriate methods in order to meet specific extension objectives with various categories of farmers will be necessary. They include (a) individual farm and home visits for follow up, (b) group methods: demonstrations to farmers groups, field days, (c) Mass Media to create awareness and reach large population at a time, (d) Farmers Trainings, and (g) Participatory methods in which extension staff work with farmers to analyze current situations and problems and determine appropriate action for self reliance (Pretty & Volouche, 1997). Examples include RRA, PRA, and Farmer field schools (FFS), IMP etc. These extension methods are the tools extension staff draw from, to address specific needs. Their use cannot be restricted but levels of emphasis may vary.

(iv) Geographical Coverage
This forms the basis for the operation of geopolitical and agro- ecological zones.
Choice of communities for donor supported programmes, are usually politically motivated. Some programmes are based on comparative advantage of the area such as Comprehensive Agricultural Support Programme (CASP), National Extension Recovery Programme (NERP) and Land and Agrarian Reform Project (LARP). Other communities have to be developed as well in order to achieve broad based development. This is why statewide programmes like the ADPs need to be supported with adequate public funding, staffing and media support.

Decentralization of extension to lower tiers of government as stated in South Africa’s Agricultural Policy is necessary for planning, implementation, monitoring and evaluation of extension programmes at the provincial level. If PGs take responsibility for extension as the closest to the grass root, farmers’ needs could be better met because the staff will be localized, conversant with the needs and would be able to facilitate extension activities
more effectively. Every activity should reflect local needs e.g. training and mass media messages, and materials should be locally produced.
Local action plans should be developed at the community level and passed upwards (Bottom-up) as obtained in Western Cape and others.
It is also necessary to address comparative or otherwise advantages posed by natural resources in terms of production e.g. fisheries resources, potentials for ilima, forestry/tree crops, arable, livestock or even environmental degradation/hazards which might require control measures e.g. flooding, erosion, soil infertility, water pollution. This will ensure effective resource utilization, conservation and adequate sustenance of the environment.

(v) Clientele
Contado (1997) estimated active population in agriculture for the world as 51% and for Africa 76% (FAO 1994). All gender categories need to be involved proportionately for equity and goal attainment.
All socio-economic strata and gender categories in the rural areas must be reached for sustainable Agriculture and Rural Development (SARD). However due to the high proportion of the small scale farmers they have to be targeted while not neglecting large and medium scale farmers. This will address issues such as continuity of farming as business, youth restiveness, unemployment, rural – urban migration and vices, direction of research for technology generation, provision of infrastructures, achievement of desired goals and cost effectiveness. Population characteristics and resource availability through good data base that are gender disaggregated would help to adequately target beneficiaries.

(vi) Organizational issues
The organization of the extension system should be well spelt out in the National Policy on Extension and Advisory Services. This according to Contado (1997) affects the framework for the service, scope, magnitude and structure of the extension system, effectiveness and impact of the extension service. He identified centralized, decentralized, cooperative and pluralistic organization of extension with different degrees of involvement of Central and Provincial Governments. South Africa extension is more or less the decentralized type but the Central coordinates, Provinces carry out extension programmes, manage and control activities and resources. As observed by Contado (1997), the pluralistic type of extension organization is emerging in many countries.

(vii) Staffing
Considering the enormous functions and tasks of extension, technical competence and number of professional staff in the organization becomes crucial. The pre-service training must be adequately designed (Swanson, 1984) to cover the broad areas such as technical subject matter, communication and education, rural social systems and information about extension organization and operations. There should also be provision for staff development. This is particularly relevant because of shortage of extension staff vis-à-vis geographical coverage and farming population.

(viii) Extension Funding
GCAE (1990) noted that there is insufficient fund to provide adequate coverage of SARD for all groups of farmers especially resource – poor subsistent ones, women and youths in developing countries. There is need for substantial public funding of agricultural
extension (AE) because of the benefits accruable. The general impression is that extension is expensive and wasteful; the criticism of T&V but huge investment will be required to develop a country with over 70% involved in agriculture and who are rural based to attain broad based development. Contado (1997) suggests that ways to improve efficiency and reduce cost of public extension should be explored by stakeholders. This could be through encouraging group approach, but not neglecting individual contacts, use of mass media channel. Cost sharing by the 3 tiers of government, support from development partners, the private sector, NGOs and farmers organizations could be fixed as obtains in donor supported programmes.

(ix) Stability
The ADP is a veritable and formidable structure any sector could have to reach the grass-root. This structure should be maintained and sustained. It has stood the test of time, survived for close to 30 years. Various extension programmes in agricultural and rural development; LARP, CASP etc. and cross cutting issues like nutrition, HIV/AIDS and malaria have continued to be channelled through the structure. The LGCs should take over at their respective block levels and be more responsive. The proportion of resources to provide; staff, fund logistics etc. should be stipulated in the AEP.

According to Contado (1997), National Policy on Extension and Advisory services is expected to promote stability of extension system, must be flexible, responsive to all major groups of producers and inclusive to allow public, private, NGOs to contribute fully to development (Swanson 1990 p.11). Frequent organizational changes within extension affect effectiveness and should be avoided. Contado cited USA 1914 as having 100 years of Cooperative Extension System Law, Japan 1958 as having 56 years and Thailand1968 as having 46 years of following their extension policies respectively. Extension and advisory Services is recognized as having contributed significantly to increased agricultural productivity and development in these countries.

Training and visit approach though criticized made its mark and due to its flexibility and adaptability, it could still be operated in areas where transfer of technology might be necessary to make impact in increasing production in specific areas or commodities. Community based participatory approaches are equally expensive and usually localized hence required outreach to other areas. A combination of approaches could be accommodated.

5. RESULTS

Thirty of the survey instruments returned were usable. An additional 5 were insufficiently completed to be used in the study or were returned with a notation that the individual was no longer professional Extensionists within the extension office. This represents a total return rate of 85.71%. Responses were coded for computer analysis using MS Project. Descriptive statistics were used. All professional Extensionists with extension policy were surveyed. Of the total respondents, 58% were male and 42% were female. Professional Extensionists working at local extension office represented 85% of the respondents. Returns by extension practitioners closely approximated the proportions in the population: 66% crop and 34% livestock. The highest level of education reported by each respondent showed that 40% had a college diploma, 57% had a bachelor’s degree.
and 3% had a master’s degree. Twenty (20%) professional Extensionists reported they were currently aware about national policy in extension and advisory services. Only 80% could recall formulating extension policy. Sixty five (65%) would like to formulate extension policy. A Likert-type scale was used to assess level of interest. Scores ranged from 1-5, with 1 indicating slight interest and 5 indicating high interest. The distribution of ratings had a mean of 3.1 which indicated moderate interest. Over one third expressed less interest in formulating extension policy. Fifteen potential barriers were listed on the instrument and respondents were asked to identify the three which were most likely to prevent them from formulating extension policy. The most frequently identified barrier was lack of time, which was reported by 55% of the participants, 15% did not see formulating extension policy, and 20% identified a lack of experience as a barrier. Least mentioned barriers included fear of negative career impacts (2%), lack of reward in annual performance appraisal (2%), not recognized in promotion criteria (3%), and cultural barriers (3%).

6. CONCLUSION & IMPLICATIONS

Extension is crucial to development in the agricultural sector and overall national development. Contado (1997) asserts that there is need to legislate Extension Policy so that it will be well organized, financially stable for effectiveness and sustained impact. The fact that extension cuts across all other sectors of agriculture, forestry and fisheries demands that its coordination, funding, subject matter, staffing, geographical coverage and organization be guided by a framework in which its programmes and activities are implemented. South Africa has to respond to the call of GCAE to formulate comprehensive and well articulated National Policy on Extension and Advisory Services. The need for paradigm shift from top - bottom transfer of technology (TOT) to more participatory approach which emphasize community driven development (CDD) and sustainable agriculture and rural development makes comprehensive and well articulated National Policy on Extension and Advisory services a necessity.

REFERENCES


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VISIT TO OUTENIQUA EXPERIMENTAL FARM AND THREE PROJECTS IN THE GEORGE DISTRICT.

SOME OF THESE PRESENTATIONS IN MS POWERPOINT FORMAT IS INCLUDED IN A SEPARATE FOLDER ON THE CD. THE FOLDER'S NAME IS: CONFERENCE 2014 - POWERPOINT PRESENTATIONS / PROJECT VISITS IN GEORGE DISTRICT.
THE ROLE OF THE RESEARCH PROGRAMME IN STRENGTHENING EXTENSION SERVICES RENDERED TO SMALLHOLDER FARMERS TOWARDS ACHIEVING NDP IMPARATIVES.

Trautmann, I.19,

The presentation focussed on the Department of Agriculture Western Cape and its programmes, the NDP and its focus areas (with special reference to agriculture), an overview of the Outeniqua research farm, and the link between research and extension in bridging the knowledge gap.

The Department and its eight programmes serve its clients from 62 offices across the Province. One of these programmes, Research and Technology Development Services, executes its research portfolio from seven research farms, of which Outeniqua research farm is the Centre of Excellence in pasture and dairy management for the Southern Cape.

Chapter 6 of the National Development Plan (NDP) focusses specifically on agriculture, and ten areas of agricultural advancement and ten areas of innovation were highlighted during the presentation and three areas, viz adaptive research, farmer support incubators and appropriate technology was emphasised and linked to extension in the Southern Cape and the Outeniqua research farm.

Outeniqua research farm of 300 ha is just outside George and has an annual rainfall of 728 mm. It is the only research facility of its kind in South Africa doing research on dairy and beef cattle systems on planted pastures. It is also the only research facility with pasture/animal capacity and infrastructure to carry out research on the scale where animal production and economics can be evaluated and a benchmark set for producers. A total research staff component of 46 (including 2 specialist researchers, 2 senior researchers, 4 technicians and 38 support staff) is responsible for the research output of the farm and its research programmes. The farm has a dairy herd of 815 animals of which 400 cows are in milk. Fodder flow for milk production is based on primarily kikuyu over-sown with ryegrass. The aim of research executed on the farm is to promote profitability and sustainability of dairy and beef farmers in the Southern Cape. Experts serve the region from the Tsitsikamma to Caledon, whilst advice is also given on request to farmers of the Eastern Cape. Researchers adapt their research for commercial farmers to that needed for small holder farmers and short courses and demonstrations are pivotal in technology transfer.

In the presentation, the pasture systems for milk production, as well as the factors affecting the production potential of pasture systems, were discussed. The objective of the animal science team is to optimise milk production from pastures and to balance pasture demand with supply. Several research findings from the team, as well as future research focus areas, where discussed.

19 Chief Director, Research and Technology Development Services, Elsenburg Email: ilset@elsenburg.com
The farm also boasts a student programme, led by its two specialist scientists, where research capacity is built. Three PhD, six MSc students and two interns are currently doing research on the farm. The accolades of the research team has distinguished it as one of the best research teams in South Africa, and it is therefore pivotal to transfer the latest research information to Extension Officers and other role players.

During the presentation, the “push” and “pull” models of information dissemination was discussed, as well as the ways in which small holder farmers are supported. The question was asked how the research portfolio is aligned to the needs of small holder farmers, and how extension officers act as “information agents” to both researchers and farmers. The gap between researcher and extension officer should be bridged in a concerted effort from both parties.

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SUCCESSFUL AND SUSTAINABLE TECHNOLOGY TRANSFER FOR PROFITABLE SMALL-SCALE SUGARCANE AGRICULTURE: A CASE STUDY.


1. INTRODUCTION

Agriculture as an industry is under enormous pressure to provide food for a burgeoning population while at the same time sharing resources such as water and land for mining, industry and development. South African commercial sugarcane farms have virtually maximised their potential to significantly increase production in terms of both yield and area and the only major opportunity for expansion for the industry lies in the often under-utilised and underdeveloped rural and/or traditional farming areas of KwaZulu-Natal (KZN) Province. However, many development projects in these areas have failed to ensure that the farming initiatives continue, let alone expand, once technical and financial support is withdrawn. The perception in communal areas is that agriculture is not a profitable career choice and small sugarcane growers will not be successful, or cane growth will be poor and economically non-sustainable. The responsibility for ensuring food security lies not only with effective and efficient professional extension services but also in summoning the political will to ensure that agricultural land is effectively and sustainably protected and utilised. This case study sets out to disprove the negative perceptions around agriculture both economically and in terms of the long term sustainability of projects through training, mentorship, structured extension and showing real economic benefits to small sugarcane growers in KZN, using the Demonstration Plot Extension Methodology (DPEM).

2. BACKGROUND:

South Africa is considered food insecure in that, at 0.23ha of arable land per person, the country falls below the international food security norm of a minimum of 0.4 hectares of arable land per person (DEAT, 2006). The hectares of agricultural land per person have decreased from 0.86 ha in 1970 to 0.5 ha in 1980 and are likely to decrease to 0.2 ha by 2020 (DAE, 2002b). Should current production and consumption trends persist South Africa will experience a substantial excess in demand over production in practically all major categories of agricultural products by 2020. The full impact of climate change is still being factored in (DAE, 2002a). This means that as a country, South Africa is resource-poor in terms of suitable land for crop production. With rapid population growth and increasing economic development, demand for land and water is becoming a delicate balancing act between conflicting uses. In addition, there is simply not a lot (4% surface area) of high potential arable land available in South Africa (Collett & Mitchell, 2013). The cost to produce food in South Africa has also increased well above the

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20 South African Sugarcane Research Institute, P/Bag X02, Mount Edgecombe, 4300, South Africa. Email: william.gillespie@sugar.org.za
21 KZN Department of Agriculture and Environmental Affairs, P/Bag X9059, Pietermaritzburg, 3200, South Africa. Email: felicity.mitchell@kzndae.gov.za
22 South African Sugarcane Research Institute, P/Bag X02, Mount Edgecombe, 4300, South Africa. E-mail: mike.way@sugar.org.za
consumer price index over the last three years, placing significant pressure on the rural and urban poor. At household level, between 14 and 52% of South Africans remain food insecure (Graham, 2013). While commercial agriculture is critically important for national food security and job creation, small scale farmers have a role to play at community and household level, where many rural poor depend almost entirely on agriculture for their food, cropping excesses are traded and surpluses, if any, generate limited income. Many of these small scale growers (SSG) remain trapped in low yielding rainfed agricultural systems with limited access to fertilizers and herbicides, a reliance on tillage and hoeing leading to degrading and unhealthy soils, all of which pose a significant threat to food security (Gowing & Palmer, 2008). The sustainable utilization of agricultural land is defined as the capability of land to produce economical yields under specific uses over an extended period of time without degradation to the natural resources (DAE, 2002). This is what the DPEM intends to achieve.

The role of extension officers in determining production areas, systems and techniques applied cannot be over-emphasised. A thorough investigation into the natural resources available within the project area must be obtained and well understood in order to make informed project choices (Snijman et al, 2009). Many development projects fail due to the project area not being adequately assessed for its suitability or potential to sustain the project. This should be part of the extension officers’ expertise in conjunction with specialist advisors. Land in traditional areas is often allocated without any soil survey or land use plan being undertaken and the crop choices are often not suited to the local area. Many extension staff do not have a thorough knowledge of natural resources and their limitations and are often performance measured against targets such as the number of projects initiated or number of community gardens implemented, rather than on actual project successes e.g. achieved yields, tons harvested, income generated. For this reason, this case study also sets out to adapt performance indicators for extension officers to the needs of the small growers, rather than “soft” targets which are difficult to measure. Extension impact is noticeable over a long period yet extension officers have to be assessed annually. This means that defined outputs need to be achieved annually to effect the long term objectives.

While sugarcane is often not considered a “food security” crop, it does provide a guaranteed market with set prices per ton, enabling households to achieve food security through improved income. The sugarcane industry is highly organized and structured to accept small growers. The Noodsberg Sugarcane Mill supply area falls across both commercial and traditional farming communities. The area contains very high potential soils of the Inanda, Kranskop, Nomanci and Sweetwaters form, as well as high annual rainfall (650 to 1000mm per annum). While the commercial farms are highly productive, the traditional areas are significantly underdeveloped in terms of sugarcane production, even though access and proximity to the mill and support industries are good. Agricultural activities had stagnated by 2004, with large tracts of high-value land lying fallow, with local communities no longer valuing the resources at their disposal. An extension methodology has been developed which optimized the excellent resources in the area and attempted to close the gap between the two economies with a sustainable developed SSG industry (Gillespie et al, 2009, 2012). The developed methodology resulted in multi-stakeholder public-private partnerships and collaborations which show signs of strengthening into the future. In addition, a manual describing the entire project implementation process and necessary training tools has been developed to assist project
planners and extension officers (Gillespie and Mitchell, 2013). The case study described below, attempts to measure, through various factors, the successful adoption, growth and sustainability of this project at various levels:

- Adoption of sugarcane as a business
- Improved land management
- Increased production and expanded area
- Adoption of scientific research results
- Self-sustainability as small commercial farmers
- Technology transfer messages in appropriate repeatable format
- Environmental stability and limiting risk to climate change
- Extension tools developed
- Extension performance measures.

A case study which showcases the sustainability of the methodology is the Swayimane area, Noodsberg. Integrated farming practices occur in the area, which primarily are for household food security rather than to generate an income. In 2004, sugarcane agriculture was not viewed as a viable opportunity, yields were poor, good quality affordable seedcane was not available and most income was received from outside the community (earnings and government grants). The area consists of rolling to flat topography, with deep humic soils and high rainfall. With the mill only 20km away on a tar road, the opportunity to improve livelihoods through sugarcane agriculture was significant. After developing a new extension methodology, the DPEM, (Gillespie et al., 2006), this was implemented in an attempt to unlock the potential of the area for sugarcane and to show that this could indeed be a viable source of income.

The creation of innovative yet simple knowledge development of SSG is fundamental to the success of the sugarcane industry in this area. The DPEM (Gillespie et al, 2009 & 2012), which has a “triple bounce” effect (field training school, seedcane generation and introduction of new varieties) has been highly effective as a mechanism to introduce, develop and maintain projects in the Noodsberg Mill supply area. The DPEM is tested for its sustainability ie. how robust is this project methodology once the project moves to another site; can the small growers continue to produce at commercial levels, effectively manage their crops and resources and are they able to maintain levels of business accumen without the concentrated support of the project team?

3 METHODOLOGY: CASE STUDY: SWAYIMANE AREA

3.1 Project initiation:

The DPEM was implemented in the study area in 2006. The sites were carefully selected after assessment of a number of criteria and resources. Land use management plans were effected following good agricultural practices, including field layout, soil classification and production potential, surface runoff control, contouring and watercourses. The plant crop (two year growth cycle) planted on the demonstration plot in 2008 was closely monitored with monthly training sessions at the plot for all interested small growers from the area, following the agronomic cycle as recommended in DPEM. The costs for the plant crop were documented, training schedules with practical sessions were conducted for each phase of the crop (attendance registers were maintained throughout) and the yields and income received by the growers were obtained as per sale records.
3.2 Extension Officer Workplans and training programmes:

The extension officers had to develop field programmes and training days around each step of the agronomic cycle which were to occur at the demonstration plot, upon which the adoption, success and effectiveness of the DPEM would be monitored as well as individual extension performance assessed.

3.3 Seedcane harvested 2010:

The plant crop of quality seedcane was harvested and sold to new growers in the area. Yield, income and expansion to new areas were quantified. Yield per variety was discussed and differences were quantified so as to assist with variety choices for the area. This gave the growers the opportunity to evaluate and accept or reject new varieties on the basis of what they had experienced.

3.4 First ratoon crop:

The ratoon crop of seedcane provided the second cycle of training for growers in the area. Technology transfer effectiveness was assessed in a collaborative participative survey and the evolution of knowledge in various scientific fields of the agronomic cycle (fertility, pests and diseases, fertilizing etc) was documented. Knowledge gaps were identified and quantified in participative surveys, starting in 2009, in a collaborative project with LETGA St-Paul Agricultural College, Reunion. Critical knowledge gaps were found to be (i) a lack of knowledge of new varieties better suited to the climatic and edaphic resources in the area; (ii) little knowledge the pests and diseases affecting sugarcane yields in the area and the control techniques available (Legros & Lesage, 2011). The first ratoon crop was harvested in 2012 and sold as seedcane. All income, yield and areas planted were measured as factors.

3.5 Developed commercial farmers from the case study:

The growers that had planted seedcane obtained from the DPEM plots were evaluated in terms of number of SSG’s, area planted, yield, land use management practices, soil fertility samples submitted, environmental awareness, and in terms of their improved livelihoods due to income from sugarcane as a crop.

3.6 Resilience Building

Resilience in the SSG systems in the area was monitored through the response of the crop and yields to various seasonal changes (climate risk) as well as the ability of the SSG’s to continue to grow and expand their deliveries to the local mill whilst maintaining a high standard of productivity. The improved land and crop management is also used as an indicator of a more robust industry in the area, which is better buffered against climate change.

4. RESULTS AND DISCUSSION

4.1 Knowledge Evolution:
The knowledge of agronomic and management practices among the small sugarcane growers after three years was evaluated and results indicated a significant improvement by the growers in the area. Nearly ninety percent of the 436 small growers had improved knowledge of new varieties and some had even converted their fields to new varieties such as N48 (higher yielding). This indicated that not only had they realised the viability of sugarcane as an economic opportunity, but had also accepted scientific research results that the choice of varieties was a significant factor in terms of productivity and is dependant on soil type and pest and disease resistance. The number of growers with improved knowledge of the impact of pests and diseases on yield had doubled to 60%, and these growers had also accepted the value of buying good quality disease-free seedcane, rather than simply buying inferior cane from their neighbours. The results are shown in Figure 1. The training cycles have had significant impact on the decisions taken by SSG’s as well as improving yield and income. Other knowledge aspects were assessed and have been reported by Ramay and Lesage (2013).

Figure 1: Knowledge evolution amongst small sugarcane growers trained at the Ndlavaleni demonstration plot, Noodsberg, KZN.

4.2 Increased yield and income:

Improvement in yields and expansion in area planted to sugarcane with a concurrent increase in income were found to be significant. The DPE methodology has been highly successful. Grower numbers have increased steadily from 232 delivering growers (434 total SSG) in 2006 to 2013 peaking at 311 growers delivering to the mill (622 total SSG). This indicates a steady growth in the acceptance of sugarcane as a crop, the level of support by roleplayers and the effectiveness of the DPEM in the area. This has gone hand in hand with a concurrent increase in area planted, a more stable mill supply as well as a concurrent increase in income to the community from R6.5 million in 2006 to R19.15 million in 2014 (Figure 2).
Figure 2: Increase in small grower numbers and revenue per annum delivering to local Mill

This increase can in part be attributed to the DPEM but to assess the sustainability of this project, one needs to consider what takes place once the project team moves to a new site, and growers are left to continue on their own. In 2012, the DPEM moved to other sites and the demonstration plot cooperators became commercial growers. For example, the Ndlavaleni DPEM plant crop yielded 136 tons of seedcane which was sold to 18 SSG’s, and planted onto 14.2 hectares. This area yielded 1438 tons (R568 000 income to the SSG’s or R40 000/ha planted). The first ratoon crop of seedcane produced 158 tons, was sold locally and planted onto 12.7 hectares (estimate 1078 tons). The DPEM cooperator, now producing for himself, has achieved a yield estimate for 2014 of 125 tons on the original plot of 1.4ha (Table 1).

Table 1: Ndlavaleni Plot yields for 2012 per variety

<table>
<thead>
<tr>
<th>No</th>
<th>Statistics</th>
<th>N12</th>
<th>N37</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stalk population</td>
<td>153 000</td>
<td>127 000</td>
</tr>
<tr>
<td>2</td>
<td>Average stalk weight</td>
<td>988 g</td>
<td>836 g</td>
</tr>
<tr>
<td>3</td>
<td>Average stalk length</td>
<td>1,94 m</td>
<td>1, 73 m</td>
</tr>
<tr>
<td>4</td>
<td>Yield</td>
<td>151 tons/ha</td>
<td>106 tons/ha</td>
</tr>
<tr>
<td>5</td>
<td>RV</td>
<td>15, 36 %</td>
<td></td>
</tr>
</tbody>
</table>

The grower, through his knowledge obtained from the DPEM, continues to produce sugarcane at commercial levels (+/-100t/ha) and applied good management practices. He is now leasing additional land from neighbours to expand his operation. The improved management of sugarcane by SSG’s includes pest and disease surveys, accurate fertilizer application as per laboratory soil sample analysis and the use of correctly applied herbicides. The fields are planted on the contour, chemical weed control and soil sampling is undertaken. Their knowledge of the crop has improved significantly and yields represent this, indicating that the DEPM has resulted in a sustainable commercial-level farming operation which will continue into the future. This project has led to a significant improvement in livelihoods. SSG’s are now becoming significant and reliable.
suppliers to the local mill, and are being supported by relevant stakeholders into the future.

### 4.3 Building Resilience to Climate Fluctuations

The sustainable impact of the DPEM is also demonstrated in Figure 3, whereby yields are seen to decrease slightly after years of lower average rainfall (2005, 2008 and 2010), as is expected. However, since 2010, when the DPEM showed a significant increase in adoption and it was a very dry season, yields (t/ha) are seen to be increasing regardless of lower than average rainfall years (2012 and 2013). This indicates that resilience to climate fluctuations has become innate in the system due to improved land use planning, adoption of sustainable and effective land use management systems, planting more suitable varieties and good quality seedcane as well as good agronomic practices. By increasing the effectiveness of plant nutrient and water use, ie overall crop health, through good agronomic practices, the system becomes more robust and is able to mitigate against unplanned climate impacts and reduces the risk of crop failure. It is accepted that only one cropping season is reflected in the results, and further monitoring will continue in coming seasons.

![Figure 3: Yield (t/ha) for SSG’s with climate fluctuations](image)

The improved crop health has resulted in improved household income and food security and has resulted in socio-economic development in the community. New and improved houses have been built by individual farmers due to increased income from sugarcane and local shops have opened to supply goods to the local community.

### 4.4 Technology transfer and effectiveness:

Farmers day meetings were very well attended (minimum number 27, maximum 152 and average over 105 events was 42 participants) and the desire to learn is very much in evidence, demonstrated by the number of practical questions asked during training and
requests for printed information in local language. The effectiveness of the demonstration plot as an outdoor classroom, as well as the plot being living proof of the opportunity at hand, is evidenced by the increase in SSG numbers, area under sugarcane, yield and income.

4.5 Environmental Sustainability

The DPEM set out to not only increase awareness of the potential of the area to produce sugarcane, but to improve the environmental health of the area, which had become infested with alien invasive plant species, moribund grassland and a low level of production in integrated cropping and livestock systems. Vast tracts of land were fallow and agriculture was regarded as a poor economic option. The area was assessed in terms of soil resources and climatic constraints such as frost and temperature differences. Once fields were selected, land use plans were developed to control surface water runoff, initiate programmes for the removal of alien plants, design extraction routes and waterways and implement good agricultural practices such as contours and trashing to reduce soil erosion. Collaborative projects in the area include support from World Wildlife Foundation, Working for Water, SAPPI Fire Protection training and Working for Wetlands. These projects use the farmers days organized through the DPEM to educate and implement programs which, together with DPEM, improve production techniques which reduce soil erosion and protect freshwater systems, protect local biodiversity, implement integrated pest management systems, the value of clearing alien plants and the protection of wetland ecosystem services.

4.6 Local extension effectiveness and monitoring

There is monthly training and meetings on all aspects of planning and agronomy for extension officers. The extension officers have an opportunity to draw up detailed yearly workplans upon which they will be assessed in terms of performance and outputs. Evaluations are done against quantifiable indicators such as number of grower visits, number of DPEM plots planted, plot management, yield, number of training days held and skills development training etc. The impact of the extension service given will be reflected in the growth of of the industry in the area and by the yields and improved livelihoods obtained each season. The DPEM has strengthened the linkages between roleplayers and has given greater credibility to the extension services. The DPEM, and skills developed through this methodology, is being applied to other crops in the community. The cascading of knowledge from research scientists to the SSG’s has been improved and is now highly effective due to presentations by scientists at field days as well as practical sessions eg. Identifying variety differences, pest identification, value of fertilizer laboratory analysis and erosion prevention.

5. CONCLUSION:

The DPEM has been highly successful and has developed SSG’s from dependent, low-yielding, subsistence growers to successful, economically viable sustainable growers. The growers have improved their skills and are able to transfer knowledge and advice to other growers and are able to produce and distribute good quality disease-free seedcane locally, thus enabling additional growers to enter the industry. The DPEM is now expanding into other mill areas as the methodology to follow. The successes of the Swayimane growers
have received acclaim and been published in local and national popular print media and newspapers, which has led to growers in other areas demanding similar support. In addition to improved food security and economic growth in the area, jobs have been created, infrastructural development has been stimulated and increased levels of household income have been significant. The DPEM has shown that extension has a critical role to play in the development of sustainable, competent and economically successful growers. The DPEM has increased awareness of the critical need for continuing research and serves as a technical training facility. Relationships between relevant roleplayers have been strengthened. The contribution of SSG’s has had a significant impact on stabilizing mill supply and shows that vast expanses of land within the communal areas of KZN can be effectively managed through adapted technologies to increase agricultural productivity and assist in meeting the national food security needs.

REFERENCES:


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THE ROLE OF EXTENSION ON PROMOTING RURAL AGRICULTURAL COOPERATIVES AS RURAL ECONOMIC ENHANCERS FOR SUSTAINABLE LIVELIHOODS.

Mwanda, F. P. & Mgijima, B.

1. BACKGROUND

Rural Agricultural Cooperatives emerge from rural agricultural projects which operate on small scale farming, in a piece of land. They are referred to as emerging farmers or small-holder farmers because of their small production. They emerge as inferior participants without adequate knowledge in production dynamics though small-holder farming in rural areas is the backbone of rural economy and sustainability due to its potential for provision of food security, employment creation and entrepreneurship. The existence of viable agricultural cooperatives in rural areas is effective in creating the potential to promote the commercialisation of production that open trade liberation for economic development.

2. INTRODUCTION

Makuthandazwe Food Security Cooperative is in the King Sabata Dalindyebo Municipality, Mqanduli sub-district in the O. R. Tambo District. The Cooperative occupies a 5ha arable land on the east side of the riverbanks of the Mthatha River. It comprise of 7 elderly females and 1 male member. The Cooperative emerged back in the year 2005, as an agricultural project that was solely producing vegetables at Dobe communal garden but with the robust extension services they transformed to a highly productive cooperative within the Mqanduli area enfranchising their activities in producing tomatoes in hydroponics and producing various vegetables in the field under irrigation. They receive funding of a tractor with their equipment and the 2012 Isuzu bakkie from the department of Trade and Industry through the assistance and technical advice of the extension officers. The transformation of this project to co-operative play a major role in the community of Dobe, and Mqanduli area because they fight poverty, create jobs and skill development. The co-operative now produce high quality vegetables and sell to the Dobe community, Kei Fresh Produce market mtata and surrounding areas of Mqanduli. The extension officer play a major role on the transformation of the co-operative by rendering technical advice, brings change to the community, linking the co-operative with other departmental organization, empowering the co-operative

3. OBJECTIVES

- Is to exhibit the impact / role of extension services in moulding the rural agricultural cooperatives into successful rural economic enhancers and viable entrepreneurs.

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23 Department of Rural Development and Agrarian Reform, Main Street. Mqanduli Private Bag x 526. Mqanduli 5080. Email: fezekamwanda@yahoo.com
24 Department of Rural Development and Agrarian Reform, Main Street. Mqanduli Private Bag x 526. Mqanduli 5080. Email: nomabhongo4u@yahoo.com
• Is to raise awareness on the potential of rural female small-holder farmers on their participation in agricultural activities.
• Give evidence that commercializing rural agricultural production does create employment and income opportunities in rural people.

4. METHODOLOGY

The introduction of robust, convenient, effective extension services to improve equitable agricultural productivity for food security, economic growth and development through:

• Conducting demonstrations on soil preparations, fertilizer application, seedling transplanting, top dressing, spraying for pests and insects.
• Support with technical advice by introducing new technologies in order to improve the quality and quantity of the products- introducing best cultivars, recommended fertilizers and recommended chemicals.
• Farmer to farmer mentorship- the sharing of information by different farmers in order to develop each other.
• The engagement in the extension triangular approach i.e. research, extension and farmer for an ameliorated production.
• The provision of accredited and non-accredited trainings, exposing small holder farmers to access markets, business workshop and support programs for an improved production (empowerment).
• Integration and engagement with other developmental organizations towards sustainable agriculture development (Funding, Empowerment and Support Services).

5. THE ENGAGEMENT OF THE EXTENSION OFFICER

In 2010 the extension officer assisted the project with vegetable seedlings through the Siyakhula programme. The programme assist the small holder farmers who own small piece of land by giving them inputs of production for food security. The officers commit themselves on the project by giving them technical advice by introducing new technologies in order to improve the quality and quantity of the products- introducing best cultivars, recommended fertilizers and recommended chemicals. The officer conducted demonstrations on soil preparations, fertilizer application, seedling transplanting, top dressing, spraying for pests and insects in order to improve the production. The officer conducted non accredited and accredited trainings in order to give the farmers skills and knowledge on vegetable production.

The extension officer assisted the project through registration as co-operative at CIPRO companies, and the registrations were successful and receive the certificate during June 2011. The extension officer link the co-operative with other departmental organisation in order to seek the funding to develop the co-operative.
6. THE TRANSFORMATION OF THE CO-OPERATIVE

- In 2011 the co-operative assisted with fencing and building of the office structure by the department of Social Development.
- In 2012 the co-operative receive the three tunnels from Department of Social Development, and they use the tunnels for production of vegetable on hydroponics. The officer also play a major role by conducting training on how to manage the hydroponics, safe use of chemicals, pruning the tomato. Demonstration done on transplanting the tomato seedlings from seedling trays to plastic pots, spraying for pests and insects, how to make seedlings on the tunnels using seeds and pine bulk on the seedling trays, how to irrigate on the tunnels using automatic irrigation.
- In 2011 the co-operative assisted with a tractor and its equipment by the department of Trade and Industry for soil preparation and other production processes during production of vegetable.
- In 2012 the co-operative assisted with the Isuzu Bakkie by the department of Trade and Industry for transporting the products to the surrounding communities of Mqanduli, Mthatha and the Kie Fresh Produce Market.

7. COOPERATIVES: AS PILLAR OF AGRICULTURAL DEVELOPMENT AND FOOD SECURITY

Agriculture, including farming, forestry, fisheries and livestock, is the main source of employment and income in rural areas, where the majority of the world’s poor and hungry people live. Agricultural cooperatives play an important role in supporting men and women small agricultural producers and marginalized groups by creating sustainable rural employment.

Producer cooperatives offer men and women smallholders market opportunities, and provide them with services such as better training in natural resource management, and better access to information, technologies, innovations and extension services. Through support such as this, smallholders can achieve sustainable livelihoods, improve food security in their communities and play a greater role in meeting the growing demand for food on local, national and international markets.

8. RESULTS

Sustainable rural economy will foresee an increase in production, infrastructure development, opening employment opportunities, skills development and empowerment while increasing the household income for many rural families

9. INCREASE IN PRODUCTION AND GOOD QUALITY PRODUCTS

Good quality tomato growing in hydroponics and cabbage growing in the field
Good quality tomatoes graded and packing into boxes and ready for market
CHALLENGES

- Illiteracy and the highest standard is STD 6
- They are too old (ages 50-75)
- Too far from town its 70km away from town
- Lack of storage facilities to store their big quantity produce
- Strengthening social mobilization in surrounding villages because of illiteracy

CONCLUSION AND RECOMMENDATIONS

The extension services energies are effectively focusing both on attacking poverty and expanding robust entrepreneurial and innovative economy through agricultural development and to date extension has indeed accommodated improvement in its effectiveness to uplift rural farming communities.

The communities will need the resources and capabilities to become their own engines of development, services and skills to improve their lives and to date extension has indeed accommodated improvement in its effectiveness to uplift rural farming communities.

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THE POSSIBILITY OF IMPLEMENTING FARMER-LED EXTENSION AMONG SMALL-SCALE FARMERS IN SOUTH AFRICA.

Ramashala, M. A.25

ABSTRACT

There is no single extension model that is applicable to all situations. However, it is important to understand which particular model or aspects of the model work under specified conditions. The paper explores the possibility of implementing a farmer-led extension approach in South Africa. The philosophical view point of the paper is that farmer-led extension is a viable and an alternative extension system that deserves consideration in South Africa. One of the methods used in implementing farmer-led extension, namely training of farmer-extensionists, is used as a starting point. A detailed analysis of literature on the best practice in; method(s) of identifying potential farmer-extensionists; determining the timing and deciding on the focus of training programme for farmer-extensionists; and effective training methods, is undertaken. The role of the extension agent in identifying farmer-extensionists; deciding on the focus of training programme; determining the timing of training programme; and deciding which training methods are effective for training farmer-extensionists, is articulated. The paper concludes by presenting a theoretical framework for training farmer-extensionists as a move towards implementing farmer-led extension system.

Key words: Extension agent, farmer-extensionist, farmer-led extension, small-scale farmers, and emerging farmers.

1. INTRODUCTION

Agricultural extension in South Africa has undergone fundamental changes since the advent of democracy in 1994. Some of the changes include extending extension services to previously disadvantaged small-scale and emerging farmers (DoA, 2005:1). While these changes are good, they also present some challenges. The conventional agricultural extension system that was used achieved less than adequate success, especially for the small-scale farmers. An alternative extension system is therefore needed. The report also delegated the responsibility of strengthening extension services to provincial governments (DoA, 2005:1).

The Department of Agriculture (DoA) has sought to develop appropriate extension model that would be suitable for South African conditions. A study was commissioned (DoA, 2005:1), and the report could not recommend a single extension model for South Africa. It instead, identified important principles which should guide a framework for extension approaches. The report recommended a participatory programmed extension approach (PPEA), has and proposed five programmes, namely; extension planning and projects, extension linkage and coordination, knowledge and support, education and training, and monitoring and evaluation (DoA, 2005:1).

25 Tshwane University of Technology, Department of Crop Sciences. E-mail: ramashalama@tut.ac.za
Reflection is limited to two challenges that South African extension services are facing. The first challenge is the low extension agent to farmer ratio (DoA, 2005:11). The second one is that the majority of extension workers do not have the academic qualification to operate as agricultural advisors (DAFF, 2009:52). This suggests many extension agents may be lacking capacity to make an impact in the lives of the farmers as advisors.

Farmer-led extension could help to resolve these challenges, through training farmer-extensionists who can work as ‘informal’ extension agent. The benefits of training farmer-extensionists are two-fold. Firstly, it would reduce the ‘burden’ on the extension agents and address low extension-farmer ratio, as farmer extensionists will take over some extension activities. Secondly, farmer-extensionists are often more credible and accountable to their fellow farmers (Scarborough et al., 1997).

Farmer-led extension approach is characterised by; multi-directional communication between the extension agents and farmers, sharing of knowledge and skills, meeting farming needs and capacity development of stakeholders, and farmers taking a centre stage. Farmer-led extension approach is implemented through the following methods; training of farmers and farmer-extensionists, cross-visits among farmers, facilitation of farmers’ research into new technology, and formation and development of farmers’ group (Swanson, 2008:33; Scarborough et al., 1997).

Farmer-led extension approach requires a paradigm shift for both the farmers and extension agents (Akinnagbe & Ajayi, 2010:354). Swanson (2008:33) argued that to implement demand-driven extension system, such as farmer-led, extension agents should be trained in participatory rural appraisal (PRA). This is because in a demand-driven extension system, farmers determine their needs and have control over some extension services delivered to them (Akinnagbe & Ajayi, 2010:354). Participatory rural appraisal training equips extension agents with attitudes and skills to facilitate. This training is especially important for field level extension agents (Diop et al. 2001:16). However, many extension agents have not been trained in PRA and organising farmers into producer groups (Swanson, 2008:33).

There is a convergence between farmer-led extension approach and PPEA. Both farmer-led and PPEA are pluralistic, participatory, advocate capacity building of farmers and stakeholder, and demand-driven (DoA, 2005:1; Kokate et al., 2009:19). This convergence suggests and also confirms the thinking that, farmer-led extension approach is an alternative extension model for South Africa that should be explored.

The paper investigates the prospects of using farmer-led extension approach as a tool to provide extension services to small-scale and emerging farmers in South Africa. It specifically focuses on effective way(s) of training farmer-extensionists as an entry point to full-scale implementation of farmer-led extension approach. The methods of identifying potential farmer-extensionists; the manner in which the timing of training is decided; deciding on the focus of training programme(s) for farmer-extensionists; and effective training methods are all investigated. The role(s) of extension agent is also articulated.
2. IDENTIFYING FARMER-EXTENSIONISTS

The starting point in identifying possible farmer-extensionists is to identify existing groups and organisations in the work area, because newly formed structured are rarely sustainable (Hagmann et al., 1998:18). A good knowledge of these structures and how they function enables an extension agent to work effectively with local groups and organisations. This knowledge may include, but not limited to goals and objectives of these organisations as well as their leadership (Bembridge, 1991:253). Moreover, working with farmers’ groups is an integral part of farmer-led extension (Akinnagbe & Ajayi, 2010:354; Swanson, 2008:33; Scarborough et al., 1997). This means extension agents should be able to work with organised group of farmers as opposed to individual farmers.

Leaders of local farmers’ group can be a useful resource by taking charge of some extension activities (Bembridge, 1991:253; Swanson et al., 1997). It is important for an extension agent to identify emerging leaders. Informal or opinion leaders can be identified by talking to key members of the community. The extension agent can therefore use chain referral technique to produce a list of emerging leaders in a community. This means an extension agent can ask all the key informants, to find out who are leaders within a given community (Bembridge, 1991:255). It is important to identify someone who has an influence, as farmer may have difficulty to accept their fellow farmers to be a source of innovation (Akinnagbe & Ajayi, 2010:357). This would be one way of the process of identifying farmer-extensionists.

Alternatively, an extension agent may seek to identify leaders by finding out how decisions are made within organisations or community. An extension agent may observe who is influential by attending meetings where organisational or community decisions are taken. Another technique is to check participation of farmers in community and local organisation activities. It is advisable that an extension agent use two or more techniques before making any decision (Bembridge, 1991:255).

Bembridge (1991:254) and Swanson et al., (1997) suggested that the following characteristics should be considered when choosing farmer leaders; ability to lead, understanding local issues and identify problems, energy, influence over others, sense of responsibility, farming experience, education level, reliability and trust. However, it is not clear which of these considerations should be given more weight than the others. It is clear from the discussions however, that the potential farmer-extensionists should be a leader. The main role of farmer-extensionist is to influence behaviour change and therefore, a person with leadership qualities is required. Bembridge (1991:255-256) argued that it is also important to recognise and utilize women leadership in extension programmes. This suggests that the process of identifying farmer-extensionists must be non-discriminatory and inclusive.

Whatever, criteria is used the extension agent shall be accountable to the farmers. However, for these to happen, the farmers must be organised (Akinnagbe & Ajayi, 2010:356). It is also important to ensure that the voices of poor farmers are not neglected (Akinnagbe & Ajayi, 2010:357; De Beer, 2000:63). Consequently, different groups of people need to be interviewed informally. This will give an extension agent to obtain a holistic view of the leadership situation (Hagmann et al., 1998:18).
3. DETERMINING TIMING OF THE TRAINING

The timing of training schedule should not interfere too much with the farmers’ farming activities. Barbazette (2006:8) suggests that contextual analysis should be conducted so as to determine the best time to conduct training. This analysis should help to avoid deciding on a time that interferes with the farmers activities. However, when training is based on the wishes and aspirations of the farmers, they will make time to attend the training (Akinnagbe & Ajayi, 2010:354; Hagmann et al., 1998:16).

4. NEEDS ASSESSMENT FOR TRAINING PROGRAMME

Needs assessment is the process of collecting data on organisational requirements that could be met through training (Barbazette, 2006:5). Gupta (1999:4) argues along the same lines, but focusing on the performance gaps. Assessment of the target group needs is the first step in planning and developing extension programmes (Swanson et al., 1997; De Beer, 2000:63). Similarly, Gupta (1999:15) argued that conducting training needs assessment is the entry point in determining the areas of priority. This mean it is very important to know what target group’s needs are before a training programme can be planned and implemented.

Training needs analysis/assessment provides important information on understanding the farmers’ situation and how to address it (Sparhawk, 1995:10; Swanson et al., 1997). Training needs assessment process helps the trainer and farmers to specify the training needs. Equipping the target group with knowledge and skills help to reduce or eliminate the existing knowledge and skill gap (Gupta, 1999:4; Swanson et al., 1997; Barbazette, 2006:5).

Nonetheless, Bellis (2002:28) argued that a performance gap does not necessarily mean that there is a lack of skill. Skilled people can still produce sub-standard performance due to other factors. Hence some authors argued that simply organising training without needs assessment may results in waste of resources, because wrong or inappropriate training could be provided (Sparhawk, 1995:11; Gupta, 1999:4). The other causes of poor performance are; lack of motivation, poor supervision or management, hostile working environment, inadequate working tools, lack of feedback, and lack of opportunity to use the skills (Bellis, 2002:28).

Moreover, DoA (2005:10) argued that training programmes should seek to capacitate farmers in the following areas; technical, operational, and marketing and financial/budget planning. The process of training needs assessment can be broken down into six phases: (i) identify training needs; (ii) map the approach; (iii) produce learning tools; (iv) apply training techniques; (v) calculate measurable results; and (vi) track ongoing follow through (Sparhawk, 1995:13). Needs assessment may focus on one or more broad categories of the types of need analysis captured in table 1.

Information on training needs could be collected through; interviews, focus group interviews, surveys/questionnaires, document analysis, and observation (Sparhawk, 1995:56; Swanson et al., 1997; Gupta, 1999:16). Nevertheless, the best method is the one that gets the required information. One method or a combination of methods may be used
Participatory rural appraisal may also be used to collect information on training needs (Swanson et al., 1997). Farmer-led approach advocates a participatory process (Akinnagbe & Ajayi, 2010:355). So, any data collection methods should encourage participation of the target group.

Table 1: Types of Needs assessment (Source: Barbazette, 2006:8)

<table>
<thead>
<tr>
<th>Types of Needs Analysis</th>
<th>What the Analysis Answers</th>
</tr>
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| Performance Analysis or Gap Analysis        | • Is this issue skill/knowledge deficiency?  
• How can the deficiency be addressed?  
• Is training the appropriate way to fix this deficiency? |
| Feasibility analysis                        | • Why should this training be done?  
• Is the benefit of training greater than the cost of the current deficiency? |
| Needs versus Wants analysis                 | • Why should this training be done?  
• Is the deficiency tied to a need? |
| Goals analysis                              | • What is the specific behaviour improvement behind a vague desire? |
| Job/task analysis                           | • What is the best and correct way to do this work?  
• How can this job and task be broken down into teachable parts? |
| Target group analysis                       | • Who is the trainee for this training?  
• What is known about them to help design and customise this training?  
• What other groups might benefit from training? |
| Contextual analysis                         | • When will the training be presented?  
• What are the other requirements to deliver the training successfully? |

5. DECIDING ON TRAINING METHODS

A training programme has a better chance of producing the required results when the training methods are carefully selected. Selecting a training method is one of the most important steps in training (Swanson et al., 1997). Bass and Vaughan (1966) quoted in Swanson et al. (1997) argued that training methods should be selected on the basis that they afford the trainees the following: active participation, transfer learning experiences from training to the job, knowledge of results about their attempts to improve, reinforcing appropriate behaviour, an opportunity to practise and to repeat when needed, motivation to improve own performance, increase willingness to change. This is in line with the participatory nature of farmer-led extension approach.

There are varieties of group methods and techniques which can be used for training. To select the appropriate method(s), one should look at; the nature of the subject, available leadership and facilities, and the nature of audience (Bembridge, 1991:150-151). See the guidelines for choosing the appropriate training method in table 2.
6. ROLE OF EXTENSION AGENT

Extension agent is an important stakeholder in extension process (Oakley & Garforth, 1985). A bad extension agent can make a good extension system look bad. Oakley and Garforth, (1985) argued that if an extension agent cannot rise to the occasion, it does not matter how good the extension system is. The results will always be less than adequate. So, the role played by an extension agent cannot be overemphasised.

Furthermore, extension agent works with different people under varying circumstances (Oakley & Garforth, 1985; Bembridge, 1991:27). Bembridge (1991:27) argued that extension agent’s job should be people-centred. The ability to develop relations with different people is therefore very important. An extension agent is also seen as a change agent, to improve lives of farmers (Oakley & Garforth, 1985). In farmer-led extension approach, extension agents work with farmers’ groups (Akinnagbe & Ajayi, 2010:354; Swanson, 2008:33; Scarborough et al., 1997). This means extension agents should be able to work with organised group of farmers as opposed to individual farmers. These assertions have an implications on the skills set that the extension agent needs to have.

DoA (2005:8) prescribes the skills set of an extension agent to include; client-orientation and customer care, communication, project management, knowledge management, service delivery innovation, problem solving and analysis, honesty and integrity, and

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<thead>
<tr>
<th>Table 2: Group methods and techniques according to purpose, programme objectives and general requirements (Source: Bembridge, 1991:151)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buzz Session</td>
</tr>
<tr>
<td>Committee Meeting</td>
</tr>
<tr>
<td>Conference</td>
</tr>
<tr>
<td>Results Demonstration</td>
</tr>
<tr>
<td>Method Demonstration</td>
</tr>
<tr>
<td>Discussion Group</td>
</tr>
<tr>
<td>Field Trip</td>
</tr>
<tr>
<td>Field Day</td>
</tr>
<tr>
<td>Panel Discussion</td>
</tr>
<tr>
<td>Question Period</td>
</tr>
<tr>
<td>Seminar</td>
</tr>
<tr>
<td>Short Course</td>
</tr>
<tr>
<td>Symposium</td>
</tr>
<tr>
<td>Workshop</td>
</tr>
<tr>
<td>Drama</td>
</tr>
</tbody>
</table>
people management and empowerment. Angstreich and Zinnah (2007:90) suggests that extension agents need to be equipped with the following skills and competencies; be critical and system thinkers, work in participatory mode, diagnose clients’ needs effectively, listen to and learn from clients, communicate clearly, facilitate experiential learning, mobilize technical and political and other support, identify opportunities for training, work in a rapidly changing and complex environment with little supervision, and present practical options to clients based on sound agricultural practices. However, being able to facilitate PRA methods is more important in farmer-led extension approach (Diop et al. 2001: 16; Swanson, 2008:33).

There are no models of an extension agents’ role that can be applied universally (Oakley and Garforth, 1985; Bembridge, 1991:27). Various views on what the extension agent’s role should include; (i) being a catalyst for farmers to act, (ii) transforming farmers’ attitude, behaviour and social organisation, (iii) connecting government and people, (iv) initiating process of change, and (v) influencing the innovation/decision-making process (Oakley & Garforth, 1985; Swanson et al., 1997). An extension agent may also assume a role of educator, facilitator or catalyst. This role is less about the knowledge and more about the farmers’ personal development (Swanson et al., 1997). These roles require an extension agent to be a facilitator rather than a teacher.

6.1. Role of extension agents in identifying farmer-extensionists

To achieve local ownership, agricultural development activities must; start by motivating farmers to participate and identify local organisation to support these developments (Hagmann et al., 1998:16). Consequently, local extension agent must have thorough knowledge of the community structures, their leaders and their needs (De Beer, 2000:66). Bembridge (1991:255) suggests that extension agent must attend forums where community decisions are taken. This will help the extension agent in identifying the potential farmer-extensionists. The extension agent plays an observatory role. The basis on which farmer-extensionists are chosen should be transparent and enjoy the support of the general farming community. This is because farmer-led is about decentralisation of power and accountability (Akinnagbe & Ajayi, 2010:355).

6.2. Role extension agents in determining the timing of training

Extension agents should ensure that the farmers are available at the time set for training (Bembridge, 1991). Farmers should decide on the ideal time for training since farmer-led extension is about self-determination (Akinnagbe & Ajayi, 2010:354). Extension agent must therefore facilitate the farmers’ analysis of their needs and priorities. In this way the extension agent harness the farmers’ natural energy and get them motivated to commit themselves (Hagmann et al., 1998:16). In order to increase participation, it is very important that the extension agent is mindful of farmers’ daily activities.

6.3. Role extension agents in determining training needs

Extension agents spend most of the time working in the field with farmers (Bembridge, 1991; De Beer, 2000:66). Extension agents must focus on the concerns and needs of the farmer. However, it is not the task of an extension agent to solve farmers’ problems (Bembridge, 1991:27-28). It is part of the duties of an extension agent however, to
identify the needs of the farmers, in a participatory manner (Akinnagbe & Ajayi, 2010:356). However, most extension agents are not adequately trained for this role (DAFF, 2009:52).

Kraft (1994), quoted in De Beer (2000:66), suggested the use of consultants or private organisations. However, De Beer (2000:67) also cautioned that, while consultants and private organisations may bring greater responsibility towards the community involved, they may also create dependency. When their contracts have expired, they no longer have a role to play in the community. If and when consultants and/or private organisations are used, it should be in a way that ensures sustainable development (De Beer, 2000:67).

A farmer-led extension approach compliant solution on the issue of trainers is needed. Diop et al. (2001:17) suggested training the existing field-level extension agents. These extension agents can be trained through training-of-trainers workshops and then be given practical experience by making them co-trainers (Diop et al., 2001:17). This solution is more acceptable and addresses the issue of sustainability and skills transfer.

6.4. Role in deciding on training methods

An extension agent needs to be a specialist in extension methods and human behaviour (De Beer, 2000:63). Bembridge (1991:150) provides a framework for choosing appropriate training methods as shown in table 2. The role of the extension agent is therefore to match the objectives and purpose of the training with appropriate methods or technique. This suggests that the extension agent should be knowledgeable in these methods and how they are used.

7. CONCLUSION AND THE CONCEPTUAL FRAMEWORK

It is clear that extension agents need to be trained in PRA methods and in working with farmers’ groups in order to operate effectively in farmer-led extension approach. A process of training farmer-extensionists should be participatory, inclusive and sustainable. A change in attitudes and mind set for both the farmers and the extension agents is necessary. Farmers have to express the issues and how they would like them addressed and extension agents should adopt a role of being a facilitator rather than a teacher.

A conceptual framework (see table 3) has been developed through literature. This framework is a work in progress and therefore still need to be tested and refined. It provides the platform for developing a better and deeper understanding on how best farmer-extensionists can be trained to play a significant role in extension activities and agricultural development in general.
Table 3: The conceptual framework for training farmer-extensionists

<table>
<thead>
<tr>
<th>Farmer-led approach process</th>
<th>Best practices</th>
<th>Role of extension agent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>▪ Work with farmers’ groups</td>
<td>▪ Attend meetings where community decisions are taken</td>
</tr>
<tr>
<td>1. Identify farmer-</td>
<td>▪ Identify informal and emerging leaders</td>
<td>▪ Analyse farmers’ participation in community and local organisation activities through observation</td>
</tr>
<tr>
<td>extensionists</td>
<td>▪ Be non-discriminatory (include women, youth and other groups in extension activities)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Attend meetings where community decisions are taken</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Analyse farmers’ participation in community and local organisation activities through observation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Motivate the farmers to be committed to training programme</td>
<td></td>
</tr>
<tr>
<td>2. Decide on timing of</td>
<td>▪ Conduct contextual analysis to determine a time that will suit farmers.</td>
<td>▪ Facilitate the analysis of farmers’ needs and priorities</td>
</tr>
<tr>
<td>training</td>
<td>▪ Farmers must decide of the best timing of training</td>
<td>▪ Use PRA methods to facilitate the process of training needs assessment</td>
</tr>
<tr>
<td></td>
<td>▪ Motivate the farmers to be committed to training programme</td>
<td></td>
</tr>
<tr>
<td>3. Decide on training</td>
<td>▪ Conduct training needs assessment with the involvement of farmers</td>
<td>▪ Be skilled in extension teaching methods</td>
</tr>
<tr>
<td>needs</td>
<td>▪ Use more than one method</td>
<td>▪ Choose the appropriate method/s</td>
</tr>
<tr>
<td></td>
<td>▪ Facilitate the analysis of farmers’ needs and priorities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Use PRA methods to facilitate the process of training needs assessment</td>
<td></td>
</tr>
<tr>
<td>4. Decide on training</td>
<td>▪ Use guidelines outlined in Bembridge (1991) or any other relevant guidelines</td>
<td></td>
</tr>
<tr>
<td>methods</td>
<td>▪ Use participatory methods</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ Facilitate the analysis of farmers’ needs and priorities</td>
<td></td>
</tr>
</tbody>
</table>

REFERENCE


SOCIAL ENVIRONMENT AS A CHALLENGE FACING EXTENSION PRACTITIONERS IN ICT APPLICATION.

Neno, T. W. 26

ABSTRACT

The study aimed at investigating if farmers have positive attitudes towards the application of mobile phones in the extension work. The small project, undertaken, required that no sampling method be conducted. The data were collected with the structured questionnaire at Bizana. Frequency counts and percentages were used in investigating if the farmers are positive to mobile phone and chi-square to test statistical significance. The mean and variance were used to discover the focus of farmers in different aspects of mobile phones.

The results revealed that farmers are positive towards the application of mobile phones in extension work. A significant difference existed in all items shown in the study. There existed a great degree of consensus among farmers except where mobile phones are thought to provide timely information. Extension practitioners are found to be aware of, interested in and positive to the application of mobile phones. It is recommended, therefore, that government should continue providing up dated mobile phones to extension practitioners as they do provide necessary information to farmers. However; extension officers should be instructed to understand that use of mobile phones is user friendly as they disagree.

1. INTRODUCTION

Over the years, rural farmers depended on traditional, local and indigenous knowledge for improved farming systems and animal husbandry (Obidike 2011). Our agricultural systems range from poor farm yield, emergence of new crops and animal diseases. Whereas agricultural information is hoped to get to rural farmers via extension workers, mobile phones are regarded to play a crucial role in providing needed change (Ozowa 1995).

Previous studies have been undertaken regarding mobile phones. Most of them are on communication between friends (Ozowa 1995). Fewer studies are on popular functioning of mobile phones (Mabe 2012). Others are focused on gender studies (Mitra 2005). Our current study focuses on the application of department provided mobile phones by extension practitioners on agricultural extension delivery services.

The study is significant given the fact that the results may provide a process or framework which should assist extension managers in making decision on providing the device. Extension officers are expected to find the study useful in facing highlighted challenges in information and communication technology use. It is therefore crucial that

26 Department of Rural Development and Agrarian Reform, Eastern Cape.
Email: zikodebizana@gmail.com
the study is conducted to assist the department take an appropriate action more effectively.

Our study hypothesizes that extension practitioners have negative attitude to the application of mobile phones on agricultural extension delivery services. The hypothesis may be broken to indicate three claims. The extension officers are negative towards the use of mobile phones on extension services; male and female extension practitioners are significantly and equally unlikely to have the same attitude towards mobile phones in extension work; and there is less degree of consensus among respondents farmers on any attitudinal item regarding mobile phones use.

2. METHODOLOGY

No sampling method was used owing to the small extent of the project. All agricultural development technicians and chief agricultural development technicians (N = 31) at Bizana service, are included as the study respondents. One of the reasons for inclusion was that each one of them was provided with a cell phone by the department to increase work coverage and delivery service.

A questionnaire is the instrument used in data collection in the study. It consisted of two sections. The Section A part of the questionnaire requested the respondents to supply the necessary bio-data and other information belonging to socio-economic characteristics. Section B part of the questionnaire contained the questions raised for the study. Questions are based on the previous studies and on the theoretical framework of the sociology of mobile phones. The questionnaire was structured on a five-point scale of strongly agree (5), slightly agree (4), unsure (3) slightly disagree (2) strongly disagree (1). A total of five questions and thirty eight items were raised for extension officers. If 5% level, at df= 1, exceeded, a statistical significance exists and a null hypothesis is rejected.

Data Collection for section A part of the questionnaire was analyzed using descriptive statistics involving percentages. Analysis of data collection for the section B part of the questionnaire was based on 5-point scale. SPSS software was used to determine significant differences. Mean and variance were used to discover importance and degree of extension officers’ level of agreement.

3. RESULTS

Table 1 summarizes the demographic profile and descriptive statistics. The results of descriptive statistics showed that the majority of extension officers are males, 46 – 55 years old and have a Diploma in Agriculture.
TABLE 1: DEMOGRAPHIC PROFILE OF RESPONDENTS

<table>
<thead>
<tr>
<th>DEMOGRAPHIC ITEMS</th>
<th>FREQUENCIES (N)</th>
<th>PERCENTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age Distribution</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 – 25</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>26 – 35</td>
<td>9</td>
<td>29.0</td>
</tr>
<tr>
<td>36 – 45</td>
<td>8</td>
<td>25.8</td>
</tr>
<tr>
<td>46 – 55</td>
<td>12</td>
<td>38.7</td>
</tr>
<tr>
<td>56 +</td>
<td>2</td>
<td>6.5</td>
</tr>
<tr>
<td><strong>Education STD</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>15</td>
<td>48.5</td>
</tr>
<tr>
<td>Degree in Agric</td>
<td>9</td>
<td>29.0</td>
</tr>
<tr>
<td>Post degree in Agric</td>
<td>7</td>
<td>22.5</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>5</td>
<td>16.1</td>
</tr>
<tr>
<td>Male</td>
<td>26</td>
<td>83.9</td>
</tr>
</tbody>
</table>

Table 2 shows the following frequencies and percentages: The majority of the respondents (90.3%) agreed that mobile phone use is not limited to foreign language. On the question of use of mobile phones to reach the illiterate farmers, 100% of the respondents agreed. Again nearly 100% of the respondents agreed with the statement, “the use of mobile phones enhances greater farmer participation.” It is noticed that 100% of the respondents felt use of mobile phones enhances faster farmer interaction.

Again 100% of the respondents agreed that the use of mobile phones is affordable and is not constrained by farmers’ background. However, over 50% of the respondents felt mobile phones are not user friendly. Nearly 100% of the respondents felt mobile phones are a source of agricultural information. Ninety seven percent of the respondents state that mobile phones are not limited by physical infrastructure.
### Table 2: Frequency and Percentage Distribution of the Responses

<table>
<thead>
<tr>
<th>Item</th>
<th>N</th>
<th>STA</th>
<th>SLA</th>
<th>U</th>
<th>SLD</th>
<th>STD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use of mobile phones is not limited to foreign language.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>32.3</td>
<td>29.0</td>
<td>29.0</td>
<td>9.7</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2. Use of mobile phones reaches the illiterate farmers.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>21</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>67.7</td>
<td>32.3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3. Use of mobile phones enhances greater farmer participation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>15</td>
<td>10</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>48.3</td>
<td>32.3</td>
<td>6.5</td>
<td>9.7</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>4. Use of mobile phones enhances faster interaction.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>19</td>
<td>10</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>61.2</td>
<td>32.3</td>
<td>6.5</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5. Use of mobile phones is not limited by physical infrastructure.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>18</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>58.2</td>
<td>19.3</td>
<td>19.3</td>
<td>3.2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6. Use of mobile phones is affordable.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>17</td>
<td>10</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>54.8</td>
<td>32.3</td>
<td>12.9</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>7. Use of mobile phones provides timely information.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>13</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>41.9</td>
<td>25.8</td>
<td>3.2</td>
<td>0</td>
<td>29.0</td>
<td></td>
</tr>
<tr>
<td>8. Use of mobile phones allows greater use of both text and messages</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>15</td>
<td>9</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>48.4</td>
<td>29.0</td>
<td>19.3</td>
<td>3.2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>9. Use of mobile phones goes beyond farmers background</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>15</td>
<td>14</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>48.4</td>
<td>45.1</td>
<td>6.5</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>10. Mobile phones are user friendly.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>6.5</td>
<td>12.9</td>
<td>19.3</td>
<td>16.2</td>
<td>45.1</td>
<td></td>
</tr>
<tr>
<td>11. Mobile phones is the source of agricultural information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>18</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>58.2</td>
<td>25.8</td>
<td>9.7</td>
<td>0</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>12. Use of mobile phones by both officers and farmers do not motivate towards farming.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>6.5</td>
<td>12.9</td>
<td>19.3</td>
<td>16.2</td>
<td>45.1</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 indicates that, while the majority of both male and female respondents felt mobile phones are not limited by foreign language, female respondents (100%) expressed this opinion. There is a significant difference between both male and female respondents’ expression. More male respondents (60.0%) felt use of mobile phones enhances greater participation, affordability to rural woman farmers and that use of mobile phones do not motivate towards farming. Both female and male respondents unanimously and significantly felt mobile phones are used to reach the illiterate farmers; enhancement of faster interaction; provision of timely information and that mobile phones are not user friendly.
<table>
<thead>
<tr>
<th>STATEMENT</th>
<th>A</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>D</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>M</td>
<td>F</td>
<td>M</td>
<td>X²</td>
<td></td>
<td>F</td>
<td>M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Mobile phones not limited by foreign language.</td>
<td>N</td>
<td>5</td>
<td>23</td>
<td>0</td>
<td>3</td>
<td>14.071</td>
<td></td>
<td>100</td>
<td>88.5</td>
<td>0</td>
</tr>
<tr>
<td>2. Mobile phones reach the illiterate farmers.</td>
<td>N</td>
<td>5</td>
<td>26</td>
<td>0</td>
<td>0</td>
<td>13.813</td>
<td></td>
<td>100</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>3. Use of mobile phones enhances greater participation.</td>
<td>N</td>
<td>3</td>
<td>24</td>
<td>2</td>
<td>2</td>
<td>15.780</td>
<td></td>
<td>60.0</td>
<td>92.3</td>
<td>40.0</td>
</tr>
<tr>
<td>4. Use of mobile phones enhances faster interaction.</td>
<td>N</td>
<td>5</td>
<td>26</td>
<td>0</td>
<td>0</td>
<td>13.813</td>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>0</td>
</tr>
<tr>
<td>5. Use of mobile phones not limited by physical space.</td>
<td>N</td>
<td>5</td>
<td>25</td>
<td>0</td>
<td>1</td>
<td>13.333</td>
<td></td>
<td>100.0</td>
<td>96.1</td>
<td>0</td>
</tr>
<tr>
<td>6. Use of mobile phones is affordable to rural women.</td>
<td>N</td>
<td>3</td>
<td>26</td>
<td>2</td>
<td>0</td>
<td>18.667</td>
<td></td>
<td>60.0</td>
<td>100.0</td>
<td>40.0</td>
</tr>
<tr>
<td>7. Use of mobile phones provides timely information.</td>
<td>N</td>
<td>5</td>
<td>26</td>
<td>0</td>
<td>0</td>
<td>13.813</td>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>0</td>
</tr>
<tr>
<td>8. Use of mobile phones</td>
<td>N</td>
<td>5</td>
<td>25</td>
<td>0</td>
<td>1</td>
<td>13.333</td>
<td></td>
<td>100.0</td>
<td>96.1</td>
<td>0.0</td>
</tr>
<tr>
<td>9. mobile phones are user friendly</td>
<td>N</td>
<td>5</td>
<td>26</td>
<td>0</td>
<td>0</td>
<td>13.813</td>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>10. Mobile phones are the source of agric information.</td>
<td>N</td>
<td>5</td>
<td>24</td>
<td>0</td>
<td>2</td>
<td>14.067</td>
<td></td>
<td>100.0</td>
<td>92.3</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Table 4 shows the following: Use of mobile phones to reach the illiterate farmers has the mean score of 1.3; meaning that it is closer to “strongly agree”. The statement has the variance of 1.6. This indicates the great degree of consensus among the respondents on this item. The feeling, by extension officers, that “mobile phones are not user friendly” and that “mobile phones motivate farmers towards farming”, have a mean score of 3.9 respectively. The mean score shows closeness to “slightly disagree”. The former statement indicates closeness to “slightly agree” (1.7). The latter statement indicates a low variance (1.1), meaning a great degree of consensus among the respondents.
### TABLE 4: DEGREE OF AGREEMENT OF THE RESPONDENTS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>N</th>
<th>STA</th>
<th>SLA</th>
<th>U</th>
<th>SLD</th>
<th>STD</th>
<th>MEAN</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Not limited to foreign language.</td>
<td>N</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>0</td>
<td>2.3</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>32.3</td>
<td>29.0</td>
<td>29.0</td>
<td>9.7</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Reaches the illiterate farmers.</td>
<td>N</td>
<td>21</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>67.7</td>
<td>32.3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Enhances greater farmer participation.</td>
<td>N</td>
<td>15</td>
<td>10</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1.8</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>48.3</td>
<td>32.3</td>
<td>6.5</td>
<td>9.7</td>
<td>3.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Enhances faster interaction.</td>
<td>N</td>
<td>19</td>
<td>10</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1.5</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>61.2</td>
<td>32.3</td>
<td>6.5</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Not limited by physical infrastructure.</td>
<td>N</td>
<td>18</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>1.7</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>58.2</td>
<td>19.3</td>
<td>19.3</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Use of mobile phones is affordable.</td>
<td>N</td>
<td>17</td>
<td>10</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>1.6</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>54.8</td>
<td>32.3</td>
<td>12.9</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Use of mobile phones provides timely information.</td>
<td>N</td>
<td>13</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>9</td>
<td>2.5</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>41.9</td>
<td>25.8</td>
<td>3.2</td>
<td>0</td>
<td>29.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Allows greater use of both text and messages</td>
<td>N</td>
<td>15</td>
<td>9</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>1.8</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>48.4</td>
<td>29.0</td>
<td>19.3</td>
<td>3.2</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Use of mobile phones goes beyond farmers background</td>
<td>N</td>
<td>15</td>
<td>14</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1.6</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>48.4</td>
<td>45.1</td>
<td>6.5</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Mobile phones are user friendly.</td>
<td>N</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>14</td>
<td>3.9</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>6.5</td>
<td>12.9</td>
<td>19.3</td>
<td>16.2</td>
<td>45.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. The source of agricultural information.</td>
<td>N</td>
<td>18</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1.4</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>58.2</td>
<td>25.8</td>
<td>9.7</td>
<td>0</td>
<td>6.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Do not motivate towards farming.</td>
<td>N</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>14</td>
<td>3.9</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>6.5</td>
<td>12.9</td>
<td>19.3</td>
<td>16.2</td>
<td>45.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4. DISCUSSION AND CONCLUSION

The study’s findings show that gender, age and education play a crucial role in the use of mobile phones in extension work. It is consistent with some previous work. Mitra (2005) says that mobile phones are not utilized in similar ways by men and women and as a result some differences in use exist. These differences may not be significant.

The findings of the study show that extension practitioners’ feelings are positive than negative towards the use of mobile phones in extension work. Higher communicative
connectivity can be achieved among different actors. Cell phones are useful for interconnecting emergency agencies. More females than males accept that mobile phones are not limited by foreign language; that that use of mobile phones enhances greater participation by farmers; that use of mobile phones is not limited by physical space and that mobile phones are a source of agricultural information. This should possible imply that women are more accepting the technology and its application on agricultural extension delivery services. Female extension officers see the uses of mobile phones empowering than men do feel. In other instances both females and males regard mobile phones a positive empowering device. They both see that illiterate farmers, with faster interaction are reached with timely information. The study revealed that the use of mobile phones do not motivate farmers to farm is not important point to them. In this all officers hold the feeling at Bizana. Again, extension officers, believe that mobile phones are user friendly is not focused to them in the applications of the device. However, extension officers’ don’t show great degree of agreement on the point. From the study it is clear that illiterate farmers are reached with the use of mobile phones and is regarded by extension officers as the item which the most emphasis should be placed on. Farmers do agree on this item.

Extension officers feel that the use of mobile phone to reach the illiterate farmers is of central importance to them, according to the mean. Likewise, the statement claiming that the use of mobile phones by both officers and farmers do not motivate farmers to farm sustainably is important to them. There is great degree of consensus among respondents on the item, “mobile phones are limited by foreign language”. There is low agreement among farmers on the fact that the use of mobile phones provides timely information, as indicated by either the smaller and / a greater variance.

Extension practitioners are aware of the nature of mobile phones. They are knowledgeable of the advantages of mobile phones on extension delivery service. However, extension officers do not see or feel mobile phones as user friendly device. Mobile phones could be used by children and older people alike and this very crucial point on which to expand agricultural service. It means that the hypothesis, claiming that the extension practitioners are negative to the applications of mobile phones on extension service delivery, is refuted.

The findings are in line with some previous works. Cell phones have the power to connect farmers to agricultural services, information and markets (Haug 1999). Extension officers use mobile phones to communicate agricultural information hence they are the source of information to improve agricultural knowledge (Christoplos 2010). Extension officers are aware that mobile phones are one of the technologies crucial in the utilization of information (Mabe and Oladele 2012). Trinova (2006) says that agricultural technicians feel that the use of mobile phones may increase interest in particular activity. The study’s findings are consistent with the sociological theory of mobile phones. Cell phones create a new aspect in which all human beings are equal, irrespective of gender and age (Puro 2002). They can be used by younger children, illiterate, marginal population segments and handicapped in a process of change (Roos 1993). However, the majority of farmers do not align themselves with the above claims.

In conclusion, the study investigates whether farmers have negative attitudes with significance between male and female farmers. Our evidence demonstrates that farmers
are positive towards the application of mobile phones on agricultural extension delivery services with significant differences between female and male extensionists. Moreover, the experience of using mobile phone technology assisted extension officers get information passed through to farmers irrespective of gender and area of operation. It means that officers’ use of mobile phone device demonstrates that conservatisms is defeated. Other crucial finding from the study is the evidence indicating that farmers can equally benefit from the concentration effort of the farmers.

Having found that extension officers are aware and positive to the applications of mobile phones significantly, it can be recommended that government should continue supplying technicians with the devices. That the department’s staff does not accept the fact that mobile phones are user friendly; any government’s intervention should be made. Unless this position is taken into consideration, departmental programmes are limited.

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MOVING BEYOND BORDERS, MEETING SOCIAL INNOVATION NEEDS AMIDST CHANGE: A NEW VISION OR FUTURE TASK FOR EXTENSION?

Musa, M. W.27, Umar, S.¹ & Atulomah, N. T.¹

ABSTRACT

The battle against climate change and the concomitant conditions constitute a complex task which requires different approaches within and beyond different countries. To improve the productivity and well-being of rural people under varying conditions, platforms are needed that would facilitate the creation of new products, services and processes that sufficiently address their social innovation needs. As policy makers and development professionals contend with climate-change related concerns, helping rural people adapt will require a clearer vision of how rural farm systems will be affected and supported. This paper proposes to address the question: how can the extension system assist rural people meet their social innovation needs in response to climate change? This position paper draws on philosophical and contemporary issues, facts, events, theoretical and conceptual underpinnings that have significant bearings to the theme. Scientific predictions, current trends and consequences of global warming leave no doubt that considerable readjustment is required on the part of national policies, development professionals and rural communities to cope with change. Rural communities need information and additional donor support on social innovations to deal with climate change consequences. To meet this challenge ahead, strengthening the extension system is crucial in providing the information needed for implementation.

Key words: Climate change, extension system, social innovations, rural communities

1. INTRODUCTION

The disastrous outcomes of climate change are well documented (United Nations, 1998; IPCC, 2007; Nyong et al. 2007). In recent times, the global manifestations of climate change can be felt in the incidences of earthquakes, cyclones, landslides, droughts, heat waves, storms, floods, degradations in coastal landforms and fertile soils. Current records of drought in California and in many parts of sub-Saharan Africa, unusual heat waves and forest fires in Australia and Russia, earthquakes in Chile and Nicaragua, landslides in China, hurricanes and cyclones in America, tsunami in Japan, floods in England and in parts of India, clearly depicts that climate change knows no borders. While those hardest hit by the extremities of climate change are the resource-poor groups of developing countries, the need to act fast is becoming an issue of top priority. For developing countries to cope with the severe consequences of climate change on the food security and livelihoods of their populations massive funding will be required, and early warning systems alongside other mitigation strategies must be set up. Without debate, climate change has various cross-cutting implications which affect different borders and sectors.
including agriculture, health care, education, natural resource conservation, rural-urban and regional planning as well as extension delivery services. While policymakers and other development professionals have to take global climate change into consideration, decisions made and objectives set out will have to be constantly reviewed beyond national borders. This is because sectoral and multi-sectoral policies made regarding climate change will have consequences in determining the vulnerability and resilience of many national economies and their relationships with one another in the future (Fröde and Scholze, 2010:327).

For the rural people of Africa and Sub-Saharan Africa, the evidence of extreme climate change has resulted into crop failures, shortages of water for irrigation, food insecurity and hunger. Incidences of erratic rainfall patterns, high incidences of pests and disease, drought, high temperatures, soil degradation, storms and floods accumulate into setbacks towards attaining development goals. In Nigeria, among many rural communities, disasters caused by extreme climatic conditions are becoming ever more common. Not only is climate change exacerbating poverty, but also increasing social innovation needs of rural communities for better disaster protection and sustained livelihoods. In many ways, the battle against poverty and meeting social innovation needs of rural people and their communities are complementary objectives. However, how they are easy to reconcile pose a key challenge and raises a number of questions:

- What are the social innovation needs defined by rural communities within the site-specific context of their climate change disasters?
- How can awareness between policy makers and rural communities be raised about the way in which climate change is affecting agricultural and rural development?
- What are the information needs and communication pathways required by policy makers and rural communities so they can safeguard their livelihood systems against climate change?
- How can extension delivery services meet the information needs of policy makers as well as the social innovation needs of rural communities in the battle against climate change?

Centrally, these questions form the basis for the position of this paper. The paper seeks to provoke reflections on global development agenda especially as various organizations and agencies are preoccupied with making suggestions on what a meaningful achievement against climate change could be in 2015 and beyond.

2. SOCIAL INNOVATION NEEDS: CONCEPTUAL CLARIFICATIONS

In the classical and neo-classical theories of sociological thought, there is an agreement that the terms, ‘social needs’ and ‘social innovations needs’ are dominant concepts. Despite distinction in their definitions, in reality the relationship between them as convenient analytical concepts is not mutually exclusive (Musa et al., 2014). Social needs have long been the platform in the drive that makes people adapt to their environments and function toward attainment of goals for need satisfaction (Maslow, 1943; Roberts, 1975; Tay and Diener, 2011). The classical social philosopher William Graham Sumner (1940) described social needs by stating that: “...Every moment brings necessities which must be satisfied at once. Need was the first experience, and it was followed at once by the blundering effort to satisfy it...” From his point of view, two facts can be drawn.
Firstly, the relationship between man, environment and technology is triggered by the urgent task and experience to meet social needs. Secondly, it presupposes that efforts to meet social needs results in moving beyond borders and creating linkages with other members of society or groups for social need satisfaction. Thus, social needs can be described as the desires, motivations, wants and aspirations that apply to individuals or groups at points in time, causing the demand for intervention towards goal attainment. In this regard, social needs serve as critical determinants for technology development, battle against climate change and the search for livelihood sustainability.

‘Social innovations’ constitute a term that is increasingly gaining prominence among development professionals in recent times. The focus on social innovations draws on the concern of how new innovations or services can be produced to bring about changes that meet social needs in problem-solving (Musa, et al, 2014). Social innovations are not just about technology, but rather a driving force towards improving productivity and adequately meeting public social needs (Bielak et al., 2008). Mulgan (2006) have defined social innovations as “new ideas (products, services and models) that simultaneously meet social needs and create new relationships or collaborations”. It goes without saying that the concept of social innovations provides the forum for research and innovation towards the development of new area, new markets, new services and social processes. Social innovations are driven by people’s social needs, ambitions, resource endowments, challenges and social problems faced (Klerkx et al., 2012).

Social scientists often make reference to social needs synonymously with terms such as ‘client or felt needs’ (Dixon 1982). Neihoff (1969) gave four typologies of social needs and how social innovations are determined by them. These are:

1. Solicited felt-needs: When peoples’ needs are so intense and cannot meet their obligations in coping well with or climate change challenges, so they actively seek for assistance and support from external sources.

2. Demonstrated felt-needs: When people attempt to solve their needs or climate change challenges without external support.

3. Ascertained felt-needs: When peoples’ needs or climate change challenges are discovered and clarified with them through interactive discussions and collaborative efforts.

4. Generated felt-needs: External agencies create the need in a manner that people are convinced of some sort of deficiency in their lives regarding climate change challenges, and made to realize that change toward a desired direction is crucial.

These typologies of needs are by no means exhaustive; rather they provide essential insights that enable the understanding of the behavioural alternatives, goal orientations and social norms that are capable of influencing rural people in the process of battling with climate change. As rural people continue to experience threats of global climate, the most challenging need for them is how they can or be supported to retain their development opportunities and potentials. While agricultural sustainability in many rural sectors of Africa requires flexibility in both ecological management as well as economic activity, essentially, rural people are in need of innovations that both improve agricultural productivity and contribute to mitigating climate change. Rural people need information and capacity support to enable them diversify and cultivate crops and livestock breeds that can succeed well in a range of varying conditions including tolerance to stresses such heat, drought, pests and diseases.
3. **POLICY RESPONSE AND APPROACHES TO CLIMATE CHANGE**

Since 1992, climate change considerations have gained the attention of international development agenda. Despite this, the borders between international development policy and mitigating climate changes are becoming more unclear. For instance, it has been observed that qualified and established donor agencies offering to play leading roles in climate change adaptation and mitigation have vested interests in expanding their business and have broken many promises, especially in the developing world (Dembowski, 2008:442). At national levels, in Nigeria, evidence show that the non-effectiveness of past agricultural policies was constrained by policy instability, policy inconsistencies, narrow base of policy formulation, poor policy implementation and weak institutional framework for policy coordination. As such climate change mitigation policy measures such as early warning systems and emergency plans are insufficient or virtually non-existent. Similarly, as obtains in many African countries, stagnations in agricultural sequestration measures can be attributed to great political divides. Implementation costs are often seen as too high and decision-makers have insufficient information about the possibilities. The general agricultural approach to addressing climate change and its impact on food production has been faulted by the International Institute for Environment and Development (Bangudu, 2013). The organization argued that:

“Current policy narratives limit climate resilience in world’s dry regions..... partial narratives that underpin policy-making prevent people in dry regions from fulfilling their potential to provide food and sustain resilient livelihoods in a changing climate”.

In relation, Srijit Mishra (Bangudu, 2013) of the Indira Gandhi Institute of Development Research posits that:

“A ‘one-size fits all’ policy response to climate change will not be viable......instead, we urgently need an alternative macro policy that focuses on location-specific, decentralised, integrated, and knowledge-centric approach that pro-actively exploits diversity and variability to sustain and enhance production.”

Contextually, a world policy constitution is needed that takes into cognisance global agreements multilaterally. In 2009, at the United Nations climate summit in Copenhagen, developed nations agreed to assist developing countries with financial support for climate mitigation and adaptation of about $30 billion per annum for the years 2010 to 2012, and to raise a projected annual sum of $100 billion by 2020 (Mangani, 2014: 102). The United Nations Framework Convention on Climate Change (UNFCCC, 1992) estimates that at least US$83 billion per year will be needed by 2030 to protect the livelihoods of poor rural people in developing countries. Other negotiations that followed include: the Bali Action Plan in 2007; the Copenhagen Accord in 2009; the Cancún agreements in 2010; and the Durban/Doha Platform for Enhanced Action (2012). Alongside, various development agencies have incorporated climate change considerations into their programmes so as to ensure that attention is given to reducing the vulnerability of smallholder farmers against increased climatic uncertainty. For instance the International Fund for Agricultural Development (IFAD, 2008), runs programmes and projects that supports four types of adaptation activity. These include: diversifying livelihoods to reduce risk; improving agricultural techniques and technologies; strengthening
community-based natural resource management; and preparing for risk and coping with disaster. Similarly, the Food and Agricultural Organization (FAO, 2012) has emerged with an integrated approach for Climate Risk Management (CRM). The ultimate goal of the FAO’s CRM approach is to enhance the resilience of rural livelihoods against climate change, and to better inform climate sensitive planning and decision making, thus integrating four major aspects:

1. strengthening capacities at different levels to interpret and communicate relevant climate information, and advise local communities how to prepare for risks and capitalise on opportunities;
2. enhancing institutional and technical capacities of government institutions, civil society organisations and communities for localised risk and vulnerability assessments, and the formulation of climate sensitive development plans and policies;
3. promoting the development of practical adaptation options and demonstration of location-specific investments to foster development in the face of present climate variability and future climate change risks, and
4. promoting knowledge sharing and learning about climate change through awareness raising activities, gender sensitive risk management and policy making.

Inspite of these approaches, as the impacts of global climate change are proving more intense, it can be noted that developed countries causing global warming are not reducing their greenhouse-gas emissions. They are neither facilitating climate-relevant actions in developing countries nor fulfilling their Kyoto-Protocol obligations. Worst still, policymakers in developing countries like Africa, Nigeria inclusive, have not been able to generate viable policies or innovative strategies in adequately addressing the peculiarities of the climate change threats within their regions.

4. IMPLICATIONS FOR EXTENSION DELIVERY SERVICES

Global climate change poses immediate as well as future challenges of universal importance. Future concerns are that extreme climate change conditions will both displace and force millions of people from their homes and environments and even to move beyond borders in search of new hopes and sustained livelihoods. Increasingly, short-term, mid-term and long-term planning process and enormous funding support are crucial. Irrespective of any change that may happen now or later, multisectoral investments are needed most especially as regards effective extension delivery services. While many national extension delivery systems have been under-funded and badly neglected, private-public partnerships are needed to rebuild effective extension delivery system to enable them better respond to the challenges of supporting rural people, policy makers and donors as they plan to meet development needs amidst changing conditions.

The development of an effective extension delivery system in this case will serve as a good investment towards capacity-building of rural people to increase resilience to climate change. Effective extension delivery system can contribute to the development and provision of better informed policy guidance; appropriate forecast products with relevant impact outcomes, and locally adjust management alternatives which address social innovation needs of rural people to significantly battle negative impacts of climate
change. Under this circumstance, the role that extension has to play in climate mitigation and adaptation is both a futuristic vision and an endless task.

REFERENCES


THE EXPECTED ROLE OF EXTENSION OFFICERS IN CLIMATE CHANGE AWARENESS: ARE THEY PART OF SOLUTION PLAN TO MITIGATE THE PROBLEM OF CLIMATE CHANGE IN SOUTH AFRICA?

Ndzimande, N. D.28

ABSTRACT

Extension Officers are strategically placed to influence productivity and to do that they need newly researched information but due to poor information flow between policy makers, researchers, it is very hard for the extensionists to do their job of advising farmers. Climate change has been the talk of the world in the past years. Ways of trying to mitigate climate change and policies by South Africa has been developed. Serious plans and talks take place now and again but the people who are mostly affected by the effects of climate change are farmers and the people expected to educate these farmers are extension officers. The biggest question therefore, is how knowledgeable are extension officers on issues of climate change? The study revealed that there are gaps between researchers and extension officers. Now the question is how well then can the information developed be disseminated to the farmers? This paper seeks to analyse these gaps and give suggestions where possible and also to encourage policy/decision makers to involve Extension practitioners during planning stages to improve communication. In trying to achieve these goals 53 questionnaires were administered to Mnquma Extension Staff and Amatole Extension managers. The descriptive statistics was used to analyse data collected (SPSS 22.0).

1. INTRODUCTION

The issue of climate change has been the talk of the world in the past years. The impact of climate change varies globally; however, the problem and the challenges of climate change are becoming more threatening to sustainable economic development and the totality of human existence (Adejuwon, 2004). Most of these threats have serious impact on the agricultural sector through effects on water sources, changes in rainfall pattern, resulting droughts, floods and tropical storms.

According to Boko et al. (2007, 435), agricultural production and food security (including access to food) in many African countries and regions are likely to be severely compromised by climate change and climate variability.

Farming has always been a risky enterprise, but climate change is magnifying the risks, especially for smallholder farmers living on the precarious margins of the earth’s productive lands (IFAD, 2012). According to Hachigonta et al (2013, 207), the most vulnerable sector in agriculture was found to be that of poor farmers, including subsistence and even emerging farmers. Small-scale farmers suffer the most because of

28 Department of Rural Development & Agrarian Reform, Eastern Cape Province, P/Bag X1314, Butterworth 4960. Tel (W): 047 491 3615 Cell: 083 294 0688 Fax: 086 601 7599, Email: nzimandend@gmail.com
their dependence on rain-fed agriculture, limited financial capacity, low adaptive capacity, high dependence on natural resources, inability to detect the occurrence of extreme hydrological and meteorological events due to low technology adoption, limited infrastructure, illiteracy, lack of skills, level of awareness and lack of capacity to diversify (Kurukulasuriya & Mendelsohn, 2006a).

According to AFAAS Chairman (2013), Extensionists are strategically placed to influence productivity and need the correct information, skills and approaches to implement climate-smart interventions. Smallholder farmers, who keep Africa fed, need extension officers who are well informed about climate change, as its impact is already being witnessed in more extreme and erratic weather - threaten the continent's food security (AFAAS, 2013). According to Salim Nahdy (AFAAS Director) (2013), extension services should be the frontline for agricultural transformation in Africa, but says officers are not well versed in climate change issues, to the disadvantage of farmers who must cope with weather variability, water shortages and floods.

1.1. Problem Statement

Different studies by different researchers have taken place; most of these research focused mostly on the effects of climate change on small-scale farmers, livestock farmers, or even agriculture at large. The adaptive and mitigative measures have also been developed for trying to help the small scale farmers but the problem keeps affecting the farmers of any category. The main reason is that the adaptive and mitigative measures are not communicated in a right channel so as to reach the affected people. The main challenge making officers to be not versed is mainly the gap between the researchers and extension personnel. According to AFAAS, Researchers and extension practitioners have a huge knowledge gap, not just on the links between climate change and agricultural policies but on the phenomenon of climate change itself.

1.2. Purpose of the study

The overall objective of this paper (i) To analyse the gaps and give suggestions as to what can better improve communication between decision makers, researchers, extension practitioners and the farmers. (ii) To encourage the policy/decision makers to involve extension practitioners during planning stages to improve communication.

2. EXPECTED ROLE OF EXTENSION OFFICERS IN CLIMATE CHANGE AWARENESS

The expected role of extension officers in climate change awareness is:

- Extension officers are basically employed to give advice to farmers on ways of making sure food is available on people’s plates. Most of these ways are updated timeously by the researchers in which officers are expected to be a link of that information to the farmer.
- Extensionists are expected to increase awareness of climate change to the farmers.
- Agricultural extension according to Leeuwis (2006) is a series of embedded communicative intervention that are meant, among other things, to develop and/or
induce innovations which supposedly help to resolve (usually multi-sector) problematic situations. It has been observed that agricultural extension is involved in public information and education programs that could assist farmers in mitigating the effects of climate change (MOE FRN, 2003).

- Extension officers are expected in building resilience capacities among vulnerable individuals, communities and regions.
- The officers are expected in the encouragement of wide participation of all stakeholders in addressing climate change issues and developing appropriate framework for coping/adapting to climate change effects/impacts.

3. MATERIALS AND METHOD

Semi-structured questionnaire with both open-ended questions and closed ended questions was used to collect data. The information collected addressed issues on climate change, the awareness of extension personnel of climate change and ways to better improve communication or information flow. A total population of 53 extension services practitioners, managers and controllers of Mnquma and Amatole district (Eastern Cape). The data was then captured and analysed using software package for social science (SPSS 22).

4. RESULTS & DISCUSSIONS

4.1. Gender, Age and years of service of the farmers

In Table 1, Out of the 53 extension practitioners interviewed 66% were male and 34% were female. Generally, gender of the officer does not matter in communicating the problem or issue to the farmer. 22.3% less than 35 years of age, 26.6 % were between 35 and 49 years of age, 51.1 % were officers over the age of 50 years.

Table 1: Shows Gender and Age distribution of the Extension Officers interviewed

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number of officers</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>35</td>
<td>66.0</td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>34.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of officers</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 35 years</td>
<td>12</td>
<td>22.3</td>
</tr>
<tr>
<td>35 to 49 years</td>
<td>14</td>
<td>26.6</td>
</tr>
<tr>
<td>Above 50 years</td>
<td>27</td>
<td>51.1</td>
</tr>
</tbody>
</table>

In communicating any information experience comes with age, based on the officers interviewed, see table 2 below, 41.5% were officers that have been on service between 10 to 20 years, whilst 37.7 % were officers that had over 20 years of service and only 20.8% had less than 10 years experience. The officers all agreed that the problem of climate change is new to them as they have been on service and the planting times and rains usually come in August and most farmers usually plant around October, November
but these years planting goes as far as in February. The officers also emphasized that this climate change results to loss in production whether livestock or crop production. A number of diseases for livestock such as African horse sickness that attacked the district were as a result of these climate changes. The outbreak of armyworm in 2013 that damaged most of the maize fields was also seen as sign of the result of the climate change effects.

**Table 2: Years of service by extension officers**

<table>
<thead>
<tr>
<th>Years in service</th>
<th>Number of officers</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 10 years</td>
<td>11</td>
<td>20.8</td>
</tr>
<tr>
<td>10 to 20 years</td>
<td>22</td>
<td>41.5</td>
</tr>
<tr>
<td>30 &amp; above</td>
<td>20</td>
<td>37.7</td>
</tr>
</tbody>
</table>

**4.2 Officers awareness of Climate Change**

Figure 1 below, showed that extension practitioners were quite aware of the climate change as an existing matter and an issue to be of great concern as it affects the farmers that they serve. This was confirmed when all 53 (100%) officers that were interviewed responded as being aware of the climate change. The extension practitioners know climate change but they do not understand the whole concept as they have minimal information about it.

In as much as they were aware of the problem of climate change they got information from different source. Based on figure 1 below, 3.8 % of officers got knowledge through their own research, 28.3 % from researchers, 54.7 % from television, 11.3 % from radio news and 1.9 % from the supervisor.

![Figure 1: Sources where Extension Service providers get their climate information](image)

The changes seen are both in crop production and livestock production as the officers outlined the changes in rainfall leading to changes in planting times. Changes in production output was also seen where officers outlined low production and the increase
in unknown diseases in livestock e.g. the African horse sickness which affected the municipality after a long time of existence in South Africa.

### 4.3 Climate Change Response Plans of South Africa

In Table 3, Out of the 53 extension practitioners only 15 (28.3%) knew about the climate change response policy or plan of South Africa and 38 (71.7%) did not know anything about the response plans of South Africa. The officers did not know about the plans i.e. National, Provincial and even the local municipality plans. Those who knew about the plan agreed with John Morton who said the national agriculture policies treat climate change broadly and do not provide a detailed plan of helping the farmers.

When asked of where they are expecting to get the information especially climate change information 73.6 % of officers said from researchers stating that these are the people with current and updated information. One unknown officer even said the definition of extension says it all i.e. officers are a link/disseminate information from researcher to the officer who then transfers it to the farmers. 1.9% said they expect information from scientists, 3.8% from self-research 7.5% from supervisors and 13.2 % from climatologists. The officers agreed unanimously that they feel isolated and they don’t feel part of the solution plans of South Africa in Mitigating effects of Climate Change.

**Table 3:** Sources that Extension Servicers expect to receive information from.

<table>
<thead>
<tr>
<th>Expected information</th>
<th>Number of officers</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Researchers</td>
<td>39</td>
<td>73.6</td>
</tr>
<tr>
<td>Scientists</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Climatologists</td>
<td>7</td>
<td>13.2</td>
</tr>
<tr>
<td>Own research (Self)</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td>Supervisor</td>
<td>4</td>
<td>7.5</td>
</tr>
</tbody>
</table>

The relationship between extension practitioners and researchers was also questioned (see figure 2 below) as 79.2 % said they know researchers on work basis but the support of the kind of work relationship was questioned as most of the 79 % said we know them as people employed to provide information but no information that we can say we got from them and one officer said he knows researchers as people that come to seek information/collect data but no results has been communicated. 15.1 % had no relationship with researchers at all while 5.7 % said they know researchers as their friends.
4.4 Role of Extension Officers in Climate Change

The results showed that 100 % of the interviewed officers felt that for the betterment of the rural people they should be included in the planning stages of the climate related matters i.e. they should be invited to climate change policy planners conferences, meetings on all spheres of government as they feel little is said about them. The national agriculture policies treat climate change broadly and do not provide a detailed plan of helping the farmers. This also came as the officers were raising their concerns on the researchers and they said being involved from the planning they will better have enough understanding as there is no good communication with researchers and this will reduce the intermediaries and better improve access on information. In trying ways of improving relationship with researchers, interviewed stuff encouraged the working together of the research directorate and extension section of the district. The top management of the district should consider combining the two sections to improve working relationship.

5. CONCLUSION & RECOMMENDATIONS

Extension officers are the key in developing the rural communities as they are strategically placed to influence productivity and need the correct information, skills and approaches to implement climate-smart interventions. The fact that they lack information on the matter of climate change is an issue of concern.

The results of the study confirmed the gap between researchers and extension practitioners, with the inclusion of extension workers in the planning sessions of climate change matters the gap shall be reduced as officers will get the information exactly from the source instead of waiting. On the other hand a strong working relationship is encouraged, the feedback part of research cycle is key for improving farmer’s lives.

A district or municipality forum of the Researchers and Extensionists that will sit regularly will help minimise the gap. In trying to bring Extensionist onboard trainings, courses, workshops on climate change matters should be held. For betterment of farmer’s lives, the government policies should talk down to the affected people instead of it talking broadly of climate change. Climate change effects cascade down to farmers so
more solution plans should be made. The link through all government spheres i.e. from National, Provincial and local governments should be clear.

REFERENCES


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FACTORS THAT INFLUENCE CHOICE OF DROUGHT COPING STRATEGIES IN LIMPOPO PROVINCE, SOUTH AFRICA.

Rakgase, M.\textsuperscript{29} & Norris, D.\textsuperscript{30}

\textbf{ABSTRACT:}

Strategies for effectively managing risks and adapting to climate change involve adjustments to current activities. The objective of this study was to investigate the association between the socio-economic profile of farmers and their choice of drought coping strategies. Multinomial logistic regression analysis was used. Descriptive statistics showed a low level of education and literacy among the farmers with three quarters of the farmers being male. Most farmers had access to extension service which is a positive finding. Results of the multinomial regression analysis on the link between farmers’ socio-economic profiles and drought coping strategies showed that farm type and literacy level influenced the choice of drought coping strategies. Improvement in literacy level through extension or informal education should be prioritised to increase knowledge in drought preparedness and mitigation. Particular attention should be paid to SLAG and communal land farmers.

\textbf{Keywords:} Multinomial regression, farmers, socio-economic characteristics

1. \textbf{INTRODUCTION:}

Drought is one of the most frequent and devastating phenomena that occur in South Africa (Austin, 2008). Ngaka (2012) indicates that drought in South Africa is a major disaster in terms of total economic loss and number of people adversely affected. About half the surface area of South Africa is arid and experiences highly variable rainfall and frequent droughts. The frequency and impact of natural disasters in the farming community in South Africa have increased significantly in the last decade, with drought being the notable and the most common type of disaster (Olaleye, 2010). Nhemachema (2008) reports that Southern Africa is expected to experience increases in temperature and reduction in rainfall coupled with increased frequency of droughts and floods as a consequence of changes in climate conditions. According to Maponya and Mpandeli (2012), the World Bank has reported that South Africa has been getting hotter over the past four decades with increases in the number of warmer days and a decline in the number of cooler days. Agriculture, which is highly dependent on climatic variables of temperature, humidity and precipitation is expected to be highly affected by these changes in climatic conditions (IPCC, 2012). Exposure and vulnerability to climate extremes are dynamic, varying across temporal and spatial scales, and depend on economic, social, geographical, cultural, institutional, governance and environmental factors (IPCC, 2012). People living in rural areas and resource-poor farmers who are largely dependent on agriculture are often cited as more vulnerable to the impact of

\textsuperscript{29} University of the Free State. P.O. Box 339. Bloemfontein 9300. Email: rakgasema@gmail.com
\textsuperscript{30} University of Limpopo. Private Bag X1106, Sovenga 0727.
drought (Olaleye, 2010).

Drought losses have long been attributed to poor vegetation, soil and water management and the absence of a sufficiently complete management strategy has been pointed out as being responsible for exacerbating the negative impacts of drought (Seymour and Desmet, 2009). Communities which inhabit drought-prone areas have demonstrated intricate and diverse adaptation strategies to drought. These communities respond to drought by evasion (seasonal migration) or endurance (e.g. through forage management, changing livestock types and numbers, water and soil conservation and finding alternative sources of income (Seymour and Desmet, 2009).

Improvement of drought management strategies by farmers especially the resource-poor farmers requires an understanding of the farmers’ perceptions on drought and their drought coping strategies. Drought plans help to lessen the effect of drought (The factors that influence their perceptions and how they cope with drought situations need to be understood so that their drought mitigation plans could be enhanced and as a consequence preserves their livelihoods. The appropriateness and effectiveness of adjustments by farmers in response to drought situations depend on a number of factors such as information, knowledge and skills of individual farmers. An understanding of the socio-economic impact of drought and of farmers’ coping mechanisms is critical in designing technological and policy interventions for more effective drought mitigation. The objective of the study was therefore to determine if there is an association between the socio-economic profile of farmers and their choice of drought coping strategies.

2. METHODOLOGY:

Study area: The study was conducted at five local municipalities (Molelemole, Aganang, Blouberg, Polokwane and Lephalale) of the Limpopo Province.

Data Collection: The primary data was collected by using structured questionnaire survey and focus group discussions. Information captured on the socio-economic characteristics of farmers included sex, age, education level, literacy level, farming experience, access to agric extension, farm income, off-farm income, farm organization, farm size, farm type and location (municipality). Purposive and random sampling procedures were used to select the sample.

Data Analysis: This study employed a multinomial logit (MNL) model (Green 2003) to analyse factors influencing choice of drought coping strategy. Multinomial logistic regression uses a linear predictor function to predict the probability that observation i has outcome k, of the following general form:

\[ f(k, i) = \beta_{0,k} + \beta_{1,k}x_{1,i} + \beta_{2,k}x_{2,i} + \cdots + \beta_{M,k}x_{M,i}, \]
where $\beta_{mk}$ is a regression coefficient associated with the mth explanatory variable (age, sex, education etc) and the kth outcome (rank score). The regression coefficients and explanatory variables are normally grouped into vectors of size M+1, so that the predictor function can be written more compactly:
\[
f(k, i) = \beta_k \cdot x_i,
\]
where $\beta_k$ is the set of regression coefficients associated with outcome k, and $x_i$ is the set of explanatory variables associated with observation i. The dependent variables in the empirical estimation are adaptation strategies that are chosen by the sample households. The MLN has model has response probabilities:
\[
P(y = j \mid X) = \frac{\exp \left( x \beta_j \right)}{1 + \sum_{k=1}^{J} \exp \left( x \beta_k \right)}, j = 1, \ldots, J
\]
Where y denote a random variable taking on the values \{1,2,…,j\} for choices j, and x denote a set of conditioning variables. In this case, y represents the adaptation measure chosen by the livestock farmers while x represents a number of socioeconomic characteristics of households and other factors. Statistical Package for Social Sciences (SPSS) was used for data analysis.

3. RESULTS AND DISCUSSION

The summary of descriptive statistics for socio-economic profile of the farmers is presented in Table 1.

Table 1 Descriptive information on farmers

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;30</td>
<td>1.2</td>
</tr>
<tr>
<td>30-40</td>
<td>4.8</td>
</tr>
<tr>
<td>41-50</td>
<td>1.7</td>
</tr>
<tr>
<td>51-60</td>
<td>32.7</td>
</tr>
<tr>
<td>&gt;60</td>
<td>44.2</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>77</td>
</tr>
<tr>
<td>Female</td>
<td>23</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>13.7</td>
</tr>
<tr>
<td>Primary</td>
<td>31.5</td>
</tr>
<tr>
<td>Secondary</td>
<td>35.8</td>
</tr>
<tr>
<td>Certificate</td>
<td>7.9</td>
</tr>
<tr>
<td>Diploma</td>
<td>10.9</td>
</tr>
<tr>
<td><strong>Literacy Level</strong></td>
<td></td>
</tr>
<tr>
<td>Innumeracy</td>
<td>18.2</td>
</tr>
<tr>
<td>Illiterate</td>
<td>9.1</td>
</tr>
<tr>
<td>Partial Illiterate</td>
<td>30.9</td>
</tr>
<tr>
<td>Literate</td>
<td>41.8</td>
</tr>
<tr>
<td>Farming Experience (yrs)</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>--</td>
</tr>
<tr>
<td>0-10</td>
<td>27.9</td>
</tr>
<tr>
<td>11-20</td>
<td>30.9</td>
</tr>
<tr>
<td>21-30</td>
<td>17.0</td>
</tr>
<tr>
<td>&gt;31</td>
<td>24.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Farm Size (ha)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1000</td>
<td>38.8</td>
</tr>
<tr>
<td>1001-2000</td>
<td>13.3</td>
</tr>
<tr>
<td>2001-3000</td>
<td>11.5</td>
</tr>
<tr>
<td>&gt;3000</td>
<td>36.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Access to Agricultural Extension services</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>95.2</td>
</tr>
<tr>
<td>No</td>
<td>4.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Access to credit</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>18.2</td>
</tr>
<tr>
<td>No</td>
<td>81.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Access to TV</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>97.0</td>
</tr>
<tr>
<td>No</td>
<td>3.0</td>
</tr>
</tbody>
</table>

The profile of the farmers is characterised by a large number of older farmers and low levels of education and literacy. Most of the farmers (over three-quarters) were male. Extension services seem to reach many farmers as 95% reported to have access to extension services. 97% of farmers reported to have access to TV which could be an indication of improved living standards. Few farmers had access to credit which could be an impediment to growth and development of their farming operations.

The results of the association between farmer socio-economic profiles and drought coping mechanisms are presented in Table 2.
Table 2: Coefficients and Odds-Ratios of the association between socio-economic characteristics and drought coping strategies

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Selling Assets</th>
<th>Wait for Government Assistance</th>
<th>Relief Grazing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B coeff</td>
<td>Std error</td>
<td>Odds-ratio</td>
</tr>
<tr>
<td>Sex</td>
<td>1.39</td>
<td>4.76</td>
<td>4.035</td>
</tr>
<tr>
<td>Age</td>
<td>0.75</td>
<td>5.42</td>
<td>2.1</td>
</tr>
<tr>
<td>Education</td>
<td>1.405</td>
<td>11.5</td>
<td>4.07</td>
</tr>
<tr>
<td>Literacy level</td>
<td>1.095*</td>
<td>0.42</td>
<td>2.988</td>
</tr>
<tr>
<td>Access to agric extension</td>
<td>1.31</td>
<td>6.74</td>
<td>3.69</td>
</tr>
<tr>
<td>Access to credit</td>
<td>-2.043</td>
<td>5.35</td>
<td>0.13</td>
</tr>
<tr>
<td>Access to TV</td>
<td>-4.79</td>
<td>21.89</td>
<td>0.008</td>
</tr>
<tr>
<td>Farming experience</td>
<td>-4.712</td>
<td>4.94</td>
<td>0.009</td>
</tr>
<tr>
<td>Farm size</td>
<td>-0.24</td>
<td>9.96</td>
<td>0.78</td>
</tr>
<tr>
<td>Farm type</td>
<td>0.41</td>
<td>13.13</td>
<td>1.501</td>
</tr>
<tr>
<td>Off farm income</td>
<td>0.62</td>
<td>2.16</td>
<td>1.86</td>
</tr>
<tr>
<td>Farm income</td>
<td>-0.009</td>
<td>2.08</td>
<td>0.99</td>
</tr>
</tbody>
</table>
Most of the socio-economic characteristics of the farmers and associated farm characteristics (farm size, farm type) had no influence ($P>0.05$) on the farmers' choice of drought coping strategies. However, farm type and literacy level had an influence ($P<0.05$) on farmers' choice of drought mitigating plans. A unit increase in the variable literacy level (1.095) is associated with an increase of 2.99 in the log odds of farmers selling their assets to mitigate against the effect of drought. This was also observed with respect to selling and culling of animals, a unit increase in the variable literacy level (3.14) is associated with an increase of 2.99 in the log odds of farmers selling or culling their livestock. With respect to farm type, a unit ‘decrease’ in this variable (-0.75*) is associated with a decrease of 0.47 in the relative log odds of farmers opting to move their livestock. In this instance, farmers in LRAD (Land Redistribution for Agricultural Development) farms are less likely to adopt herd movement as a strategy to cope against drought effects. Most of these were farmers who were operating as individuals and not groups. Farmers in communal farms and farmer groups in SLAG (Settlement Land Acquisition Grant) farms were more likely to move their herds during drought periods.

There is varying information in literature as to the influence of socio-economic profile of farmers on their drought coping strategies. Ajao and Ogumiyi (2011) found influence of age, farm size, access to extension, gender and non-farm income on the choice of drought coping strategies. The study by Moyo et al., (2013) observed few explanatory variables as having influence on the coping strategies. Household herd size, household total income and household access to relief grazing farms affected choice of coping strategies while age, gender and education level had no effect. Nti (2008) observed that literacy level, membership with a farmer organization, household income, and location of households had positive and significant impacts on adaptation to drought. Farm experience, farm income and farm size had impact on drought coping strategies in the John et al., (2011) study while age, education level and extension had no effect. In a study on climate change adaptation strategies, Tazeze et al., (2012) observed that sex of the household head, age of the household head and education of the household head, family size, livestock ownership, household farm income, non/off farm income, access to credit, distance to the market center, access to farmer-to-farmer extension, agro ecological zones, access to climate information, and extension contact had significant impact on choice of climate change adaptation strategies.

Legesse et al. (2012) investigated the smallholder farmers’ perception and adaptation to climate variability and climate change in Ethiopia and the results of the study showed that agro-ecological location, sex of household head, family size, off-farm income, herd size, frequency of extension contact and training were determinant factors influencing adaptation strategies. Deressa et al. (2008) observed that wealth (on-farm income, off-farm income and livestock ownership) and household characteristics such as level of education, age of household head, household size increased the probability of adaptation to drought. Farm location also influenced farmers’ adaptation to climate change.

Al Hassan et al. (2013) reported that the presence of market, informal credit from friends and relatives, location of farmer, farmer to farmer extension, noticing of decrease in rainfall and noticing of increase in temperature influenced farmers’ choice of indigenous climate related strategies in Ghana. In the study by (Opie, 2011), coping strategies were associated with household size, age, sex of households head and household assets such land livestock and other assets. Deressa et al. (2010) observed that adaptation to climate change was influenced by education, household size, gender, livestock ownership, access to extension service, availability of credit and environmental temperature. Smithers and Smit (1997) reported that the capacity of households to adapt to droughts was influenced by resource availability and government policy. In the study by Ofuoku (2012), the major barriers to climate adaptation were lack of information, lack of money and inadequate land.
Gunn et al. (2012) assessed farmers’ psychological distress and coping in a time of drought and observed that age, gender and type of stressor had influence on type of coping strategy. The authors concluded that it is critical to develop tailored interventions in assist farmers cope more effectively during future droughts. This further supports the importance of attuning the mitigation strategies to socio-economic profiles of farmers.

4. CONCLUSIONS AND EXTENSION IMPLICATIONS:

Most of the socio-economic characteristics were not important as predictors of choice of drought coping strategies. This differs from other studies that observed relationships between most socio-economic characteristics (such as education level, age, farming experience, gender, farm income) and drought coping strategies. However, farm type and literacy level showed an association between farmer profiles and drought coping strategies. These findings have extension and policy implications. Improvement in literacy level through extension or informal education (especially that the age profile of farmers showed that most of them were elderly) should be prioritised to increase knowledge in drought preparedness and mitigation.

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WAYS TO REDUCE THE ENVIRONMENTAL IMPACT OF DAIRY FARMING.

Muller, C. J. C. & Scholts, M. M.

1. INTRODUCTION

The image of agricultural production systems is increasingly being scrutinized by welfare organizations, activist groups and the public. Intensive systems are getting the most attention. These so-called factory farms are being regarded by the public as not ideal for the production of basic agricultural products like milk and meat. The antagonism against these systems is based on two aspects, i.e. the welfare of cows and the perceived effect of these systems on the environment. The public would prefer seeing cows producing milk from green pastures as nature intended. Although pasture-based dairying systems probably provide the best living conditions for cows, except in the high summer or during winter when it rains, it might not the best for the environment. In this paper ways to reduce the impact of dairy farming on the environment, regardless of farming system, are discussed. Options include improving the efficiency of production by increasing the genetic merit of cows for higher lifetime milk yields, improving feed quality and selecting cows for reduced methane output.

2. BACKGROUND

Dairy cows, being ruminants, contribute directly to greenhouse gas (GHG) emissions. This is because of their unique way of feed digestion. Through a fermentation process, anaerobic bacteria in the rumen break down fibre type products in animal feeds to various end-products that cows use to sustain themselves. Methane (CH₄) gas, a major GHG, is produced through this fermentation process. Methane is released into the atmosphere by natural processes of belching and breathing. The only way to reduce the CH₄ gas production from farm animals is to reduce their numbers as the fermentation process in the rumen cannot be stopped or altered significantly on a long term basis. It can only be slightly changed by using lower forage diets. The rumination process has evolved over millions of years. The implication therefore, is that all ruminants in the world have for all times been contributing towards GHG and thus climate change. It is only recently that their specific way of converting feedstuffs has caught the attention of activist groups and eventually the attention of the public. By consuming high forage diets which is unsuitable for human consumption, cows produce high quality food products such as milk and meat.

Furthermore, very little has been done to find alternative food sources for humans to replace the high quality protein, fat, lactose, minerals and vitamins being consumed on a daily basis through milk, milk products or beef. The comparative impact on the environment of the production of such alternative food sources has not been modeled by activist groups.

3. COMPARING PAST AND PRESENT DAIRY PRODUCTION SYSTEMS

By modeling it is possibly to determine the effect of past and present farming systems on the environment. Capper et al. (2009) found that the United States (US) dairy herd in 2007 consisted of 9.2 million cows producing about 84 billion kg of milk. In comparison, in 1944, 53 billion kg of milk was produced by 25.6 million cows. This means that the total US milk output has increased by 58%

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31 Directorate: Animal Sciences, Research and Technology Development Services, Western Cape Department of Agriculture, Private Bag X1, Elsenburg 7607. 021-8085228 (T), 021-8085407 (F), carelm@elsenburg.com
32 ARC-Animal Production Institute, Private bag x2, Irene 0062; University of the Free State, PO Box 339, Bloemfontein, 9300, South Africa, GScholtz@arc.agric.za
while the number of dairy cows was reduced by 64%. This change in output can be ascribed to a combination of improved genetic merit of cows, better diet formulation, better herd health and housing management aimed at improving animal care. Although producing more milk, the smaller number of dairy cows resulted in a 77% reduced feed use, 90% less land use, 65% less water use and a 63% decrease in GHG emissions per kg of milk.

To produce the same amount of milk at lower production levels, as would be expected on a high forage diet like a pasture-based system, would mean a national herd consisting of a larger number of lactating cows, more dry cows and replacement heifers. A higher milk production not only reduces the number of cows but also reduces the total feed requirement and resource use of all the animals.

4. IMPROVING EFFICIENCY OF DAIRY FARMING

The best way to reduce the impact of livestock production on climate change is by improving the efficiency of production systems (Mitloehner, 2013). This means that more milk (and beef) must be produced from the same inputs, specifically ruminant feeds. The efficiency of energy utilization is increased with greater energy output (milk yield) by diluting the energy required for maintenance (Allen, 2013). Rodriguez et al. (2013) found that as milk production increased over time, total cost per kg of milk decreased regardless of year or breed. Feed, labour, replacement and operational costs also decline at increasing milk yield levels. The reason for this is the dilution of a dairy’s fixed costs. Larger dairy herds tend to have a lower cost of production and a larger milk net income per unit than small herds. Bannink et al. (2011), using a mechanistic model to predict the methane emission in Dutch dairies, showed that average methane emissions per cow per year increased from 110 kg in 1990 to 126 kg in 2010, but at the same time the average methane emissions decreased from 17.5 to 15 g per kg of milk.

Improved efficiency in dairy herds is not limited to higher milk yields by cows, but also includes better reproduction performance of heifers and cows. According to Berry (2013) the growing dairy heifer represents approximately 25% of the feed costs of a dairy animal’s lifetime. This means that an early age at first calving (before 24 months of age) would improve efficiency because of a reduction in total feed required during the unproductive period of a cow’s lifetime. Zehetmeier et al. (2012) showed that GHG emissions produced during the rearing phase of replacement heifers contribute up to 20% of total GHG emissions from modelled dairy farms. Weiske et al. (2006) reported a reduction in GHG emissions per kg of milk by 13% with a reduction in the replacement rate from 40% to 30%.

Cabrera (2013) found that feeding lactating cows more than one ration over the lactation period improves production efficiency as it provides closer-to-requirement nutritional density diets avoiding nutrient wastes. Multiple nutritional grouping reduces the number of over-conditioned cows and excess nutrient excretions improving income over feed costs.

Herd structure gives an indication of the fraction of animals in different parities, age, days after calving, pregnancy status, lactation status, etc. (de Vries, 2013). Grouping and feeding animals according to the herd structure would similarly improve herd efficiency as indicated previously. Feed efficiency is high before the peak in milk yield during the lactation; therefore a herd with more cows early in lactation would be more efficient, because of a higher average milk yield, than a herd with more cows in late lactation. Reproduction problems result in cows being milked longer after calving therefore increasing the average number of days-in-milk for the herd. Better reproduction would therefore improve feed efficiency (de Vries, 2013). As the lactation milk yield of cows increases with age (or parity), a dairy herd with more old cows, as indicated by a higher average lactation number,
are more feed efficient than a younger herd. As cows are culled from the herd because of various reasons and heifers are reared to replace culled cows, the annual cow cull rate and age at first calving of heifers would have a marked effect on herd efficiency. A low cull rate results in the best whole farm efficiency whereas a high cull rate resulted in the best cow efficiency but at a lower farm profit (de Vries, 2013).

For dairy cows, only 26% of feed energy results in useful end-products, i.e. milk 24% and fat storage 2% (Erdman, 2013). The remainder is lost as heat (33%), methane (5%), urine (3%) and feces (35%). In terms of heat production, a major loss is due to the cow’s maintenance requirement. This is driven by the cow’s live weight, however, the increase in maintenance requirement because of an increasing live weight, occurs at a decreasing rate (Erdman, 2013). Therefore, while increasing size increases the cow’s maintenance requirements, a smaller portion is used for maintenance allowing for a higher milk yield.

It has been pointed out that with the increase in milk yield; fewer cows are required to produce a specific amount of milk. As a considerable number of culled cows and bull calves born in dairy herds being reared for veal of beef production, end up in the beef market, an increase in the national milk yield would mean that the beef production coming from dairies would be reduced. Destatit (2010), as cited by Zehetmeier et al. (2012), showed that the number of dairy cows in Germany decreased from approximately 6.3 to 4.2 million while the total milk output remained constant. Because of this decrease in dairy cow numbers, gross domestic beef production was reduced by 967 million kg or 44%. Zehetmeier et al. (2012) showed that increasing milk yields reduces GHG emissions per kg of milk; however, when considering the beef contribution of dairy cows, the result changed, because the shortfall in beef production from dairy cows have to be made up by more beef animals. Zehetmeier et al. (2012) also questions the ongoing specialization in both milk and beef production systems. The alternative would be to use dual-purpose breeds either as pure-breds or in a crossbreeding programme with specialist dairy breeds.

The Fleckvieh, a Simmental derived breed from Germany, is one such a dual-purpose breed. Other similar Simmental derived breeds are the Montbelliarde in France and Abondance in Italy. At Elsenburg, two studies using Fleckvieh bulls on Holstein and Jersey cows are demonstrating the value of such a programme. Beef production of Fleckvieh x Jersey steers is 34% higher in comparison to Jersey steers while crossbred calves reared for veal reached marketing age 32 days earlier than purebred Jersey calves (Muller, et al., 2013a). The milk yield of crossbred cows is also 14% higher than purebred Jersey cows. Crossbreeding Holstein cows with Fleckvieh bulls resulted in a smaller increase in beef production while the fertility and milk composition of crossbred cows seems to be better (Muller, et al., 2013b). The better fertility and salvage value of crossbred cows should also have a positive effect on farm income and production efficiency.

A recent study (O’Brien et al., 2014) showed that the relative difference in the carbon footprint between average and high-performance dairy systems was likely to be greater than the relative difference between high-performing grass and confinement dairy systems. This suggests that improving the productivity of dairy systems has a greater effect on the carbon footprint of milk than converting from a confinement to an intensive grass-based dairy system.

Total milk yield of cows divided by their total feed intake, up to a specific age, could be considered as an efficiency indicator for dairy cows. This means that higher producing cows calving down early and maintaining short calving intervals would be more efficient than lower producing cows or cows calving late for the first time or having longer calving intervals. As it is not practical (or possible) to determine the total lifetime feed intake of animals as heifers and cows, total lifetime milk, fat or
protein yield could be considered as an indication of dairy cow efficiency. As this is related to age or productive life, the ratio between total lifetime yield and lifetime in days could be considered as an efficiency measure.

5. IMPROVING FEED QUALITY AND MANAGEMENT

There is a perception that low-input systems have a smaller effect on the environment than high-input large production systems. However, a low-input system is also a low-yield system. Such dairy systems operate on high forage and low concentrate intakes. However, a high-fibre diet increases the CH\textsubscript{4} release per kg of milk in a three-fold manner: (i) by fermenting fibres, (ii) by low productivity and (iii) by low digestibility of fibre. An increase in the use of starchy concentrates (cereals etc.) reduces the production of greenhouse gases. For high forage feeding systems, the way to reduce the effect of ruminants on the environment would be to increase the digestibility of the forage content of the diet. This implies feeding of higher digestible forages, i.e. forages harvested at an earlier growth stage.

Because of an increasing demand for milk products in the world, many pasture-based farming systems are moving towards more intensive systems. The reason for this is that the production of present day grass cultivars is not much higher than 40 years ago. This limits the milk production output from pasture-based dairy farms. To increase farm milk output, other forage crops have to be incorporated into the feeding system. A common forage crop is maize silage produced under irrigation increases the carrying capacity and milk output of a farm.

Methane gas production is positively correlated to dry matter intake (DMI) and the level of production although the percentage of dietary energy lost as methane declines with increasing DMI. A higher proportion of forage in the diet is also associated with higher enteric methane output per kg of milk compared to a more nutrient-dense (or lower forage) diet. Diets being digested faster in the rumen produce less methane gas.

Rumen distension dominates the control of feed intake in dairy cows (Allen, 2013). The filling effect of the diet, specifically the forage neutral detergent fibre (NDF) content, has a much greater effect than other fractions on feed intake. This effect varies greatly according to the digestion characteristics, fragility and particle size of the diet. The most common indicator of feed efficiency in dairy cattle is ratio of fat-corrected milk per kg of dry matter (DM) intake. In average herds this ratio is around 1.5 while reaching 1.6 in well managed herds (Erdman, 2013).

Mayor efforts have been put in reducing the loss in fecal energy by improving the digestibility of feeds. For forages this includes the stage of maturing at harvest, forage species, preservation method, feed ingredient selection and feed processing. These efforts have not resulted in improving feed digestibility, but by increasing feed intake and therefore increasing milk yield. Digestibility decreases with an increase in feed intake.

Reducing feed shrinkage has a major possibility in increasing feed efficiency in a dairy herd. Feed wastage occurs during forage harvest, feed delivery and storage, loading and mixing of diets, feeding-out and delivery of feeds (Grant, 2013). Dry matter loss from harvest to feed-out may range from 12 to 23% for maize silage. Cows that are fed for low refusals have greater eating rates resulting in a greater risk of rumen acidosis. Daily feed intake is reduced by restricting the time of feed access. An on-farm case study has shown a 3.6 kg/day higher milk yield when cows experienced 0 vs. 6 hours per day of a functionally empty feed bunk. According to Grant (2013) twice daily feeding in comparison to once daily feeding results in less sorting of feed especially
against long particles during the day. However, feeding more than twice a day reduces resting time. Regular feed push-ups, especially during the hours after feeding, and consistent feed quality and quantity along the full length of the feed trough improves efficiency with less competition among cows.

6. SELECTING FOR LOWER METHANE PRODUCING COWS

Genetic improvement in any trait is important as it is cumulative and permanent (Berry, 2013). It would be therefore make sense to breed for cows that produce less methane to reduce environmental pollution by dairy cows. Genetic gain is, however, a function of the accuracy of selection and genetic variation. Large quantities of data are required to estimate reliable genetic parameters for methane production. It is expected that the accuracy of measuring the methane production of cows directly would be difficult (Haas et al., 2011); therefore an indirect indicator or associated trait like residual feed intake (RFI) would be required. The genetic correlation between direct methane production and an indicator trait would give an indication of such a possibility. The amount of methane produced by cows is correlated to milk yield levels making it possible to select for cows producing less methane. Predicted methane emission (PME) is 6% of gross energy intake. Estimated heritability estimates for PME and RFI were 0.35 and 0.40, respectively. The positive genetic correlation between RFI and PME indicated that cows with lower RFI have lower PME values with estimates ranging from 0.18 to 0.84. It would therefore be possible to decrease the methane production of cows by selecting more efficient cows. The genetic variation suggests that reductions in the order of 11 to 26% in 10 years are theoretically possible.

Herd et al. (2011) noted that in Australia, more than 90% of livestock GHG emissions are from cattle and sheep with beef cattle contributing the most. Little change is possible in GHG emissions by changing the diet of cattle therefore selective breeding is the most wide-reaching tool for a lasting reduction in GHG emissions. In ruminants, there is a strong positive relationship between feed intake and methane production. This means that a breeding strategy that reduces the feed intake per unit of product production would result in a reduction in GHG emission intensity. Selecting for a lower methane production (MP), however, may result in a lower feed intake and possibly smaller or slower growing animals. Methane intensity (MI), that is methane produced per unit of bodyweight and methane yield (MY) per unit of feed intake, are two traits that measure methane output independent of cow size and feed intake (Herd et al., 2011). Preliminary results of Angus cows show large natural variation between animals in MP, MI and MY. Some animals produced significantly less methane per day, per kg of live weight and per kg of feed intake than the average for the sample group. Sire had a significant effect on MY and MI of animals. Results indicate that selection for a methane production trait may be possible.

Breeding objectives for dairy cattle have traditionally focused on production traits, but this has changed in recent years, leading to more balanced breeding objectives comprising a wider range of economically important traits. The measurement of traits related to animal welfare (hoof problems, lameness, laminitis), heat stress and methane emissions of dairy cows can all contribute to reducing the environmental and social impact of dairy production (Scholtz et al., 2013).

7. INTENSIVE vs. PASTURE-BASED SYSTEMS

A big debate is ongoing on the effect of intensive vs. pasture-based systems on the sustainability and effect on the environment. Because of a growing demand for milk products some countries have experienced better on-farm milk prices. This has resulted in many pasture-based dairy farms increasingly incorporating feeding additional supplements like concentrates or forage crops as hay or
silage. Supplementary feeds increases the cost of milk production which raises the demand for cows producing at higher milk yield levels.

For intensive feeding of cows, whether as a supplement to an existing pasture system or as a fully intensive feeding system, feed troughs are required. This aspect has been well researched and on-farm observation have shown that properly designed, built and maintained feed troughs would reduce the environmental impact through an improvement of feed intake and a reduction in feed wastage. This however means that cows have to spend some time on concrete to consume supplementary feeds. Although concrete is not ideal for cows, it is better than open camps that quickly become muddy with a large build-up of manure which is difficult to remove. Concreted feed lanes keep cows clean and the manure collected on them can be removed by scraping or washing into a manure holding facility where it can be used for a number of products such as compost and the generation of energy through biogas systems. In a pasture-based system only a small amount of manure, mostly around the milking parlour, can be collected. The bulk of the manure and urine is deposited on the pasture, near water troughs and on the way to the milking parlour. This creates an uneven spread of manure on the farm which in some cases could become pollution source-points.

O’Brien et al. (2014) compared the carbon footprint of the milk output from high-performing confinement and grass-based dairy farms through a life-cycle assessment. GHG emissions attributed to milk only from an Irish-type production system were 5 and 7% lower than a UK and US-type confinement systems respectively. However, without grassland carbon sequestration, all the systems had similar carbon footprints per tonne of energy-corrected milk. The way emissions are estimated and the allocation of GHG emissions between milk and meat also affected the relative difference and order of carbon footprints. For instance, depending on the method chosen to allocate emissions between milk and meat, the relative difference between the carbon footprints of grass-based and confinement systems varied by 3 to 22%. However, top-performing herds have carbon footprints 27 to 32% lower than average performing dairy systems.

8. CONCLUSION

As dairy farmers rely on the public as consumers of the end-products of milk being produced on farms, some effort should be put into improving the image of farming systems. At the same time, farmers should demonstrate their commitment towards reducing the effect of dairying on the environment. Improving the efficiency of milk production is the best way to reduce the effect of dairy cows on the environment. This means a high milk yield for cows and good reproduction management with regards to age at first calving for heifers, short calving intervals and low culling rates of cows. The breeding of cows to produce less methane gas is a future possibility. Using diets containing higher concentrate levels and highly digestible forages would also reduce methane production.

Dairy cows produce a large amount of waste products as manure and urine. Manure has been in the past been converted into compost for the improvement of soil quality. It was only through the development of easily available, cheap sources of fertilizers as waste products from the fuel industry, that farmers have stopped using manure as natural fertilizers. In the past, the methane production potential of household waste has been used to produce heat. This was later replaced by cheap electricity. Currently developments are underway again to produce electricity from manure through bio-digesters. Generally, more electricity than is required could be produced on intensive dairy farms. Unfortunately at present there is a limited market for excess on-farm-produced electricity while the cost of setting up such a unit is very high. The size of a bio-digester is determined by the
amount of manure produced on a farm. Farms in close proximity to each other could share an anaerobic digester to reduce construction costs.

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Towards Effective Land Reform Projects in Order to Provide Food Security in Metsweding District Municipality Area, Gauteng Province of South Africa: Overview.

Mfene, S.33

Key words: Land reform, food security, Gauteng province, South Africa.

1. DEFINITION OF PROBLEM

Poverty is one of the sources of the problem not only in Metsweding but also in the world as research has shown that approximately 800 million people, in the world do not have enough to eat. This implies that people across the globe are living in poverty without having enough to eat. There is a correlation between poverty, employment and income hence a concern from Metsweding District Municipality about this situation. Beside the section of households that do not have any income; the income levels are generally low (Metsweding District Municipality, 2009). There are few options which need to be undertaken to resolve the problem. One possibility is to implement Local Economic Development projects.

2. PROCEDURE

Primary information was obtained by completing typically designed questionnaires through conversations with some randomly selected farmers that benefited from land reform programme. The questionnaires were interpreted and presented to the farmers in a more understandable way and in their language (IsiNdebele & SePedi) so that genuine and detailed information could be extracted from the people who are currently beneficiaries of land reform programme.

3. FINDINGS

Agriculture remains to be the only dominant sector on which majority of the Metsweding District Municipality population has to rely for a living. Hence, agriculture is expected to be practiced in such a way that it could enable farmers to produce enough food for the growing population from the limited area of land with high efficiency. With such an objective there must be sustainable agriculture in order to cater for the future generations.

According to Adams (2004), agricultural growth and poverty reduction depend significantly on increasing agricultural productivity; thus will be particularly true for future progress in sub-Saharan Africa. There is widespread evidence that, whether a tenure system is communal or individual, freehold or leasehold, farmers are more likely to invest in their land and achieve productive gains when they have secure land rights.

3.1 Land reform

According to Department of Land Affairs (1997), land reform programme is made up of three sub-programmes namely: Land redistribution, Land restitution and Land tenure reform. Land Redistribution for Agricultural Development sub-programme (LRAD) has replaced the previous programme called Settlement for Land Acquisition Grant (SLAG). SLAG was focusing on a group

33 Department of Agriculture, Forestry & Fisheries, Private Bag X250, Pretoria, 0001; Email: SilumkoM@daaff.gov.za.
of people with a potential to become farmers and each person would receive R16 000.00 as a grant funding to assist towards buying agricultural land. SLAG did not succeed because of the huge group which it become difficulty to work together. LRAD focused on families rather than groups and had a better chance of succeeding however another challenge was looming before it was temporarily halted.

The land reform beneficiaries are profiled based on age group, gender, marital status, population group, home language, previous occupation and highest qualifications. The different age group is depicted in Table 1.

### Table 2 Age group

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 – 40</td>
<td>20</td>
</tr>
<tr>
<td>41 – 50</td>
<td>27</td>
</tr>
<tr>
<td>51 – 60</td>
<td>40</td>
</tr>
<tr>
<td>61+</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

The general picture of the age of respondents seems to be above average level. For example when one considers those with more than 40 years of age, they constitute 80 per cent. According to Adams (2004), women, regardless of their marital status or age can never acquire land or landed property on their own. Resolving gender inequality in relation to land tenure has major implications for poverty reduction, since women do most of agricultural work in sub-Saharan Africa and thus hold great potential to increase agricultural production.

It is the women who bear the great responsibility of ensuring that food is available at the table in many households. The situation of gender of the beneficiaries is depicted in Figure 1.

### Figure 2 Gender

The situation of participating gender is not surprising. It is expected that women should be in the majority in projects that show potential of fighting poverty such as land reform. No wonder they constituted 67 percent. It is important to empower women because of their role in the family in terms of achieving food security. Another critical element of the profile of the respondents is the marital status and it is reflected in Table 2.
Table 3 Marital status

<table>
<thead>
<tr>
<th>Status</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single/never married</td>
<td>20</td>
</tr>
<tr>
<td>Married</td>
<td>80</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

The general picture as far as marriage is concerned seem to be healthy. For example, 80 per cent of respondents are married and they are responsible for various sizes of families as indicated in Table 3. The gender is indicated in Figure 2, women are the major players in agriculture, the land reform programme is responding positively as 67 per cent the research respondents are women.

The remaining 60 per cent of the respondents have professional degree/diploma.

Figure 3: Previous occupation

The general educational situation of the respondents is somewhat encouraging. Almost above fifty per cent have some form of education hence this is promising for further development. Only 7 per cent have attended grades 11-12, 14 per cent have post Matric certificates, and 26 per cent are only able to read and write, and have attended school. The educational level is presented in Figure 3.
The status of land reform has been assessed based on income generating initiatives either off or on farm, farm size, type of land reform, information dissemination, owners staying on or off farm and history of farming by the beneficiaries.

The South African Land Reform programme is founded on the country’s constitution, and many policies have been adopted to transform the rural economy and lift people out of poverty. One such policy is the AgriBEE Charter which was launched with the aim of opportunities, deracialising land and enterprise ownership and unlocking the full potential of the agricultural sector (Anon, 2007).

The general picture of the annual income pocketed by farmer looks promising. For example 53 per cent of the respondents generate less than R50 000.00 on-farm income per annum and 80 per cent make 80 per cent off-farm income. This situation needs further improvement. It might be caused by the fact that high yielding varieties are not utilized. The matter is depicted by Figure 4.

![Figure 4: Highest qualifications](image)

![Figure 5: Annual on-farm income](image)

3.2 Food security
The social concept of sustainability is people-oriented, and relates to the maintenance of the stability of social and cultural systems, including the reduction of destructive conflicts. Equity is an important consideration from this perspective. Preservation of cultural diversity and cultural capital across the globe, and the better use of knowledge concerning sustainable practices embedded in less dominant cultures, are seen as desirable. There is a perceived need for modern society to encourage and incorporate pluralism and grassroots (masses) participation in to a more effective decision-making framework for socially sustainable development (Hardaker, 1997).

Social acceptability is another pillar of sustainable development. It is assessed based on three criteria namely; household food security, job creation and social responsibility programme. The first criteria to be assessed are food security and the situation is depicted in Figure 5.

![Household food security chart](image)

**Figure 6: Household food security**

The general picture of food security of the respondents is very good. For example the majority 93 per cent agreed that their farms meet the household food security needs. The second criteria being job creation was also tested and it is reflected in Table 3.

**Table 4 Job opportunities**

<table>
<thead>
<tr>
<th>Job</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>73</td>
</tr>
<tr>
<td>No</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
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</table>

The impression of Table 4 is very good. The majority of respondents 73 per cent indicated that their farms are able to create jobs because farm activities are labour intensive. However it was not established as to exactly how many jobs are created.

The next criteria to be tested are social responsibility and it is reflected in Figure 6.
There is a general understanding of social responsibility programme among the respondents. For example more than half of the respondents namely; 60 per cent indicated that they have social responsibility programme in place and are implementing it with places like crèches and old age homes.

4. CONCLUSIONS AND RECOMMENDATIONS

Based on the major findings of the study, it is the suggested actions to be considered in improving to alleviate poverty through sustainable land reform projects in Metsweding District Municipality. It has found that farmers are not able to access the formal markets. This should be the responsibility of the extension advisors/workers in the short term. It is therefore recommended that extension advisors need to be capacitated so that they can help the farmers.

Primarily, it is important to notice that farmers' involvement with relevant stakeholders need to participate in policy formulation in order to known their role in agricultural development. Land reform beneficiaries have poor capacity to sustain their farms as they lack skills such as production processes, general management, cooperate governance, financial management. This is the key for success in such programs as land reform. The research has found that farmers are not able to access the formal markets. This should be the responsibility of extension advisors in the short-term. The extension advisors need to be capacitated so that they can help the farmers.

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A CASE STUDY OF THE INTERACTION OF BENEFICIARIES AND EXPERTS WITH AGRICULTURAL DEVELOPMENT AND EXTENSION POLICY & PRACTICES IN THE WESTERN CAPE

Marais, F. J. 34

ABSTRACT

Extension officials that manage agricultural development projects are confronted with a dynamic flow of changing policy that may have an effect on entrenched paradigms and procedures of these experts. A modernisation paradigm of development that focuses on optimising agricultural production may be at odds with capabilities of beneficiaries and may miss out on supporting products that may be regarded as “niche” and satisfying certain cultural preferences.

It is evident that heterogeneous ideas of development exist, these are multi-layered and implying a non-linear path of development. There is not one future but many, and those managing it often realise that there is no straight jacket for development. What constitutes development is negotiated and contested, hinging on many bodies of knowledge and embedded experiences.

The paper investigates the interaction between the role and the position of the state to design and implement policies and how a beneficiary of an agricultural development project interprets these into meaningful realities. A range of laws legitimise policies and these become real through rules and regulations and operating procedures. Policy defines how resources should be allocated. Evidence from research has shown that there is a considerable disjuncture between general policy discourse and everyday practices. Grass-route activities often are more complex than assumed by policy makers, state officials and experts. Beneficiaries contest, interpret and re-negotiate policies and make things work for themselves.

Policies and the implementation thereof that see agricultural development as production through modern methods often do not reflect rural realities. Ideally, Government should allow that policies are eventually shaped by the users through the unpacking and analysing of everyday interpretation. Top down planning should be replaced by planning that caters for flexibility and participation, as proposed in the underlying philosophy of key policies and legislation that inform South African agricultural and rural development.

Key words: agricultural development and extension policy; beneficiaries; agricultural experts; modernisation paradigm

1. INTRODUCTION

34 Senior Lecturer & Faculty Manager: Extension, Elsenburg Agricultural Training Institute, Branch: Agricultural Development and Support Services, Department of Agriculture, Provincial Government of the Western Cape, Private Bag X1, Elsenburg, 7607. francoism@elsenburg.com 021-8085482
Agricultural extension constantly has to adapt to changing guiding policy within land reform and
general development options proposed by policy makers. South African extension personnel are
encouraged to embrace bottom-up participation by clients, and participation across spheres of
government, when designing projects and transferring technology (DRDLR 2009; DAFF 2014:6).
This emphasis is more explicitly focused on participation when making decisions than in previous
guiding documents and it does challenge extension and advisory services in various ways.
This paper interrogates the application of policy recommendations and evaluates the challenges and
opportunities these hold for extension provision. The narrow options available within a
modernisation paradigm that promotes continued scale increase and intensification are analysed in
terms of suitability for client desires and capabilities.

2. CLARIFYING CONCEPTS: DEVELOPMENT, RURAL DEVELOPMENT AND
RURAL DEVELOPMENT THEORY

The concept “development” is abstract and is interpreted in many different ways. Even within the
discipline development studies there are many different perceptions of what development is or what
the focus of development should be. Some of these ideas, as well as the understanding of “rural” will
be discussed briefly. Clarifying these concepts should provide an appropriate background against
which to understand the role of agricultural extension within agricultural development options.

As with these concepts mentioned above, many different perceptions exist of what agricultural
development projects should accomplish, and what the focus of such development should be. The
National Development Plan (NDP) does inform on these, and inform on the proposed development
paradigm encapsulated within the vision 2030 for South Africa.

Development is regarded by many as “improvement” (Seers 1972:22), and is typically defined by
development economists as the creation of conditions to reduce poverty, unemployment and income
inequality (ibid.21). Others do not attach a specific trajectory to it and define development as the
dynamic flow of situations, patterns, activities and events through time (Van der Ploeg, Van

Other scholars, for example Amartya Sen and David Clark, criticize the view held by Seers and
many development economists and argue that these criteria do not guarantee personal wellbeing (Sen
1983; Clark 2002). Sen is convinced that by providing people with adequate income does not
guarantee access to necessities like schools or hospitals (Sen 1983:756). For Sen, development is not
an increase in Gross National Product (GNP) per capita, or in consumption, health, and education
measures alone, but as an expansion of a persons’ options, choices or freedom to make judgements
on achieved wellbeing. He therefore equates human development with human wellbeing and
measures it in terms of freedom to exert social, economic and political choice which is coined as
“capabilities”.

This capability approach of Sen is still regarded by many as on the forefront of development studies.
Clark builds further on Sen’s capability approach and thus also chooses to contradict the traditional
understanding of development which focuses on utility and commodity command (Clark 2002:27).
He concludes that a deeper notion of human development is behind the concept and ultimately defines development as “a good human life ... whatever that may be” (2002:22). Development is thus about expanding the choices people have, to lead lives that they value and improving the human condition so that people will get the chance to lead full lives. He develops a non-paternalistic methodology that is based on the perceptions and values of those with limited options, thus those regarded as the poor.

The NDP declares that it “has drawn strongly from definitions of development that focus on creating conditions, opportunities and capabilities that enable people to lead the lives they desire” (NDP 2011:5). This development paradigm is thus in line what Sen and Clark postulated and it focuses on raising continuously the capabilities of people. It moves away from development that just fosters entitlement, i.e. paying grants and providing services and infrastructure (NDP 2011: 5).

Development from this view is thus more than just the creation of conditions to reduce poverty, unemployment and income inequality, and that it should encompass the expansion of a person's options, choices and freedom to make judgements on achieved wellbeing. Development is about assisting people to realise a good human life. The challenge for extension and advisory services is thus to decipher, with the participation of the proposed beneficiaries, what options are available to assist in creating the improved life through the development project.

Much has also been written about the rural-urban divide and defining these concepts is problematic. It is argued that inappropriate defining these may impact on addressing rural and urban problems and processes (Scott, Gilbert & Gelan 2007:3). The desired outcome of the process may therefore be jeopardized. The definition of “rural” (or “rurality”) that I find most appealing is that of Van der Ploeg et al. who describe it as the place where “co-production” of man and living nature is located (2008:2). According to them this is the ongoing encounter, interaction and mutual transformation (or co-production) between humans and nature and includes a wide range of different practices, or grass-root level activities. Examples of these activities mentioned are agriculture, forestry, fishing, hunting, rural tourism, rural sports and living in the countryside (2008:2).

Van der Ploeg et al. do acknowledge that these encounters between man and living nature are also evident in urban contexts, but the predominant difference is that within the urban these encounters are limited compared to encounters in the countryside. Co-production shapes living nature inasmuch as it transforms and shapes the social. Particular land-use patterns, breeds or food products (examples of the natural) co-evolve with family enterprises, identities and subcultures (examples of the social) in a specific, and often mutually reinforcing way (ibid.:2).

When this definition of the rural is accepted, then it should be accepted that agricultural development projects that strengthen this co-production should be supported by agricultural extension and support services, even if such projects are situated in so-called urban areas. This is especially true if such co-production is accepted by the specific community and and if it does not contravene veterinary and health regulations.
Considering the definitions of development, the rural, and co-production, it should be clear that the guiding principles of agricultural and rural development should be broadly the same: such development should imply revitalizing and strengthening the agricultural and rural (Van Der Ploeg, Renting, Brunori, Knickel, Mannion, Marsden, De Roest, Sevilla-Guzmán, & Ventura 2000:391). It should not merely be equated in a unilinear way to growth of the rural economy (Van der Ploeg et al. 2008:3). It is argued that indiscriminate forms of economic growth in the countryside can be highly detrimental to development (ibid.2008:3). Rurality takes different forms, which are experienced in different ways by different groups within society and that it consists of a wide range of activities (ibid.2008:5). These activities together make up co-production because it is through these activities that the natural and the cultural features of the countryside are shaped and re-shaped (ibid.2008:3).

According to this theory of rural development, the rural should be seen as a multilayered web, or network, that patterns regional rural economies and societies (ibid.:2008:6). This rural web consists of interactions, interrelations, encounters and mutualities that exist between actors (be it institutions, enterprises, state agencies or social movements), resources, activities, sectors and places within rural areas. All domains, be it social, economic, political or cultural, are involved and can be equated to comprehensive actor-networks that exist within the rural (ibid.2008:6).

Agricultural development in South Africa is intensively planned interventions. The vast amount of policy- and other working documents are a testimony to this. It seems that the agricultural development script followed by the expert system is currently aligned towards technologically advanced and mechanised production practices. These interventions are carefully planned and scrutinised and deemed desirable if they conform to modern and advanced practices. This trajectory is aligned with the policy discourse aptly named “Modernisation” by the Provincial Government of the Western Cape.

In order to satisfy a market for a product that is regarded as “niche”, those involved in agricultural development should be well acquainted with cultural knowledge, cultural practices and cultural behaviour.

3. **RESEARCH METHODOLOGY**

Interpretation of policies and expert trajectories of what development should be, can be seen through an ethnographic investigation of practices and procedures. Changing developmental approaches may bring changes, challenges and opportunities to extension and advisory delivery. In order to understand these, a qualitative analysis was found suitable. The intrinsic case study design was found most appropriate to answer the questions. Through this case study design the endeavour is to understand the case in depth, in its natural setting and recognizing its complexity and its context (Punch 2005:144). Case studies cater for multiple sources of data collection methods. In this case study, ethnographic interviews were used, thus interviews that were unstructured, non-standardized, open-ended, informal and in-depth. All the interviews were with individuals.

Observation of behaviour as a stream of actions and events that unfold were recorded on paper. Observation was unstructured, thus no predetermined categories and classifications were used.
Behaviour was thus observed as it unfolded naturally. Field notes were recorded with the consent of the interviewees. This ethnographic analysis did reveal social practices which were “shared, contested, negotiated, and sometimes rejected by other actors involved” (Long 2002: 2). It would have been inadequate to just identify structural outcomes. An ethnographic study through the lens of an actor-oriented approach enabled the deconstruction of the processes of the intervention (ibid.:4), and to come to terms with agency displayed by different actors.

4. THE CASE STUDY OF MR. PAT’S CHICKEN

Mr. Pat farmed with chicken in a very small area adjacent to his shack in a township of the coastal town of Hermanus. He bought chicks in batches of 200 every two weeks, and kept the chicks in a temperature regulated area of 2 meters by 3 meters. The 3 week old chicks were moved to a larger area in his yard. He sold the live chickens at six weeks of age. His market was on his doorstep: Many of the township dwellers, most of whom are isiXhosa, would contact him during the week and put in an order to collect and pay for the chicken on Fridays. As the extension officer explain: “Xhosa people love having fresh chicken on weekends and for special occasions”, it just taste better than the frozen chicken bought at retailers”. Live chicken were also sold to customers that used the live animal for ritual purposes.

Mr. Pat generated a profit of approximately R5000 per month through his chicken enterprise. In addition, he became well known to his neighbours and customers and it appears if building up of such useful contacts assisted him to be elected the community representative of a major political party. Mr Pat applied to be assisted to enlarge his enterprise. The only appropriate area identified for him to move his enterprise to, was in Stanford, approximately 25km from where he lived. Eventually the new project was not approved by the expert system and Mr. Pat became demotivated and stopped farming with poultry altogether.

5. EXTENSION PRACTICES OBSERVED IN THE CASE STUDY

There may be a plethora of reasons why unique and less modern trajectories are followed or preferred by (potential) beneficiaries. Potentially some of the most obvious reasons are that such agriculturalists may not be financially or competency wise ready to manage a technology advanced production unit. Another possible reason may be that their current networks and marketing mechanism are working better than advanced networks and marketing mechanisms with its associated high cost and high risk.

Although Mr. Pat desired to be involved with a bigger and larger scale of chicken production, the experts may have provided alternative advice and motivation when the larger enterprise was not approved.

Low-external input agriculture is often pursued by these clients of the department. This probably was the way through which they were able to enter agricultural production. Establishing their enterprises in this way protected them from being dragged too deeply into dependence on external and sophisticated markets. Extension, and the associated expert system, is challenged to investigate these
alternative practices and heterogeneous ideas of development as viable alternatives. This is not only true during the initial stages of support, but may be real and viable long term prospects.

Research in the Western Cape shows that extension services do struggle to embrace practices and preferences that focus on creating conditions, opportunities and capabilities that enable people to lead the lives they desire and that work for some beneficiaries. This is especially true if such practices do not fit the expert view of what ‘real’ agriculture is. The essence of what many believe extension is might proof to be its biggest weakness. The traditional view of the function of extension, which is the transfer of new technology, proof to be a major stumbling block. When this traditional perception is combined with an entrenched preference towards a modernisation paradigm, it proofs to be a lethal combination for agricultural initiatives that do not fit preferred expert trajectories. Research has shown that the expert system in the Western Cape is inclined to support development processes that fit the modernisation paradigm (Marais 2008).

6. CONCLUSIONS AND EXTENSION IMPLICATIONS

The NDP do encourage participation in decision-making. In this case study Mr. Pat did desire to enlarge his enterprise and was involved in the decision to apply for a bigger production unit. True participation should include the understanding of cultural knowledge, practices and behaviour. As with other niche products, i.e. Bresse chicken from France (Poulet de Bresse) where consumers are prepared to pay much more for a product that satisfy certain taste and aesthetic preferences (the red crown, white feathers and blue feet of the chicken that resembles the French National flag), specific cultural preferences also exist in South Africa. isiXhosa people living in the township outside Hermanus do prefer to buy live chicken that they can slaughter themselves in order to satisfy certain beliefs and practices. It is argued that the live product produced on the doorstep of consumers in this township should be regarded as niche.

This development paradigm of local production on small scale may not be in line with the modernisation paradigm. Production in this area may not be considered by some to be in the rural, but co-production does exist. If real participation is embraced by the expert system, then cultural preferences of communities should be accepted.

A bigger production unit established for Mr. Pat could have played favourably towards the economy of scale of production, but other logistical arrangements may have been negatively influenced, i.e. transport of the live product to the market and the re-establishment of a suitable area from where to sell live chickens. Being removed from the community may also have a detrimental effect on the beneficiary’s social network and thus have other cost implications than just the financial.

Extension personnel are wedged between a hard rock and a stone: On the one hand they are guided by expert procedures to establish projects that are using modern and specialised techniques, and on the other hand they must try to satisfy the wishes of beneficiaries that do not necessarily follow the modernisation paradigm as envisaged by experts.
The expert system are challenged to reconsider their stance towards the kind of development that beneficiaries desire and the way beneficiaries want to connect to land and create livelihoods. The expert system is advised to embrace the co-production concept and accept that farming patterns co-evolve with individual and societal preferences, identities, family enterprises and subcultures. Revitalization and strengthening of the rural will only be sustainable if co-production is seriously considered. A strategy of farming economically may enable many of these smaller farmers to remain viable without entering into the logic of modernisation (Van der Ploeg 2000). The South African model of creating niche produce and the South African development trajectory that encourage local innovativeness and sustainable livelihoods and vibrant local markets might differ substantially from what many think development should look like.

Livelihood strategies and practices that attempt to increase the basis of livelihood assets at the disposal of emerging producers should be acknowledged and supported by development agencies. This rural development trajectory is accepting products and services that do not blindly follow the modernisation view of development. Such include not only the development of new products, services and markets, but also products, services and markets that might be regarded as traditional and culturally preferred. In the South African context it might imply that development agencies should accept the reconstruction of agriculture and linkages to markets. Rural and urban agricultural production might look different than envisioned by a modernisation paradigm. In this development model ways of production and markets should reflect the needs of society. Unique forms of cost reduction and the associated knowledge base should be embraced. Such ways of production do not necessarily imply higher or lower value of the product, but might have an effect on overall profitability and alternative livelihood linkages.

In this development model locality is important. Survival and success depends on partnerships and networks of actors that might not be regarded as important when viewed from a strict modernisation paradigm. The relations between the agricultural producer and society are regarded as important, and involve a variety of spheres of social and economic life. The way we see land, nature, eco-systems, plants, animals, craftmaship, labor, networks and market partners might need to be reviewed. Our view of resource basis might just as well need to include the “old” and the traditional. Our view of food supply chains should accommodate production means that may not be regarded as high quality production by modern standards. But such may be preferred by the unique South African market.

REFERENCES


A COMPARATIVE ANALYSIS OF TWO LAND REFORM MODELS: THE MASHISHIMALE FARM MANAGEMENT MODEL AND THE NKUMBULENI STRATEGIC PARTNERSHIP MODEL, SOUTH AFRICA.

Terblanché, S. E. & Stevens, J. B. & Sekgota, M. G.

1. INTRODUCTION AND BACKGROUND TO LAND REFORM IN SOUTH AFRICA

Land reform is a process of transferring the land from one owner to another through certain legislation that governs the entire process. In most of the African countries, land reform is about transferring land from white owners to black claimants who have been dispossessed the land in the past by the apartheid regime. According to Oxford dictionary, the word “reform” means to make better by removal of imperfections, faults or errors (The Concise Oxford Dictionary, 1979).

Land reform in South Africa is regarded as part of the Reconstruction and Development Programme (RDP) and as such it has a contributory factor towards the national reconciliation, growth and development in the country. The program commenced in 1994 immediately after the first and new democratic government came into power. Land reform in South Africa is a lawful process that is being guided by policies (Department of Land Affairs, 1997). In order to achieve the objective of 30% land transfer by 2014, the Land Reform Programme is structured around three pillars:

Land Redistribution – aims to create equality by providing black people with access to land for either productive or residential purposes;

Land Restitution – aims to return land to black South Africans who were forcibly removed from their land by the apartheid system; and

Land Tenure – aims to provide labour tenures with secure tenure (ownership or occupancy rights) of land (DLA, 1997).

According to Monama (2006), many farms that were used to contribute to critical food supply in the country and that have been transferred to land claim beneficiaries in Limpopo Province have collapsed due to a lack of a financial support from government, lack of farming knowledge and skills, and more worse, internal squabbles and fighting. According to Monama (2006), in some instances, land is bought but the farm machinery required for farming is excluded. In many cases farmers who sold their farms to beneficiaries resorted to put their farm machineries on auction because Government failed or delayed to make payment.

Yende (2007) reported the numbers of beneficiaries on the land reform projects (Bophelo ke Semphekgo and Maboi 3 Community Trust) have dropped because of the distance to be travelled to the projects, lack of profit, lack of farming and business skills, lack of farming interest and internal fighting that are coupled with theft (of income) from the sales made. In 2008, the Department of Agriculture (Agriculture, Forestry and Fisheries) and Department of Land Affairs (Rural Development and Land Reform) realized that there was a need to establish a different program called

35 Senior lecturer, Department AEERD Faculty of Natural & Agricultural Science, University of Pretoria.
Email: fanie.terblanche@up.ac.za

36 Senior lecturer, Department AEERD Faculty of Natural & Agricultural Science, University of Pretoria.
Email: joe.stevens@up.ac.za

37 E-mail: mike.way@sugar.org.za
Land and Agrarian Reform Project (LARP). Government came up with a new approach namely “Profit-sharing partnership”, which was seen to improve the success of land reform programs. The new approach to land reform encourages the commercial farmers to establish partnership with the land reform beneficiaries in South Africa (Hofstatter, 2010).

2. LITERATURE REVIEW ON LAND REFORM WITH SPECIAL REFERENCE TO RESTITUTION CLAIMS AND AFTER CARE SUPPORT

2.1 Post-Settlement Support models for the South African situation

Although there are several models of post-settlement support such as equity schemes and mentorship programs, this research study focused on the use of a Farm Management Model and a Strategic Partnership Model.

Farm Management Model

There are many definitions and descriptions of farm management, but they all focus on achieving the set objectives of a farming enterprise or business. “Farm management can be described as the rational decision-making to achieve the objectives of the particular farming enterprise” (van Reenen and Marais, 1992: 2). According to van Reenen and Marais (1992), a farm manager should concentrate on formulation of the farm business objectives and making decisions that will also help to achieve those objectives. One of the most important factors, according to these authors to be considered on the farming business is labour as it requires proper planning, organization, implementation and control like any other production factor. A farm manager should be knowledgeable in terms of the labour laws to ensure that he is acting and guided by the current labour relations legislation. “Farm Management can be regarded as the process whereby a farmer plans, organizes, coordinates and controls all the production factors of a farm business, namely land, labour and capital, in order to attain certain objectives such as maximum profit growth, sustainability and an improved standard of living” (Van Zyl, Kirsten, Coetzee & Blignaut, 1999: 3).

Some of the land claim communities find it important and necessary to employ knowledgeable and skilful farm managers to assist them to manage the farms on their behalf. However, it does not seem to be so much helpful hence there are more challenges that are being brought than production and growth of the farms. This notion is apparent with Somershoek farm which is situated near Amersfoort in Mpumalanga Province (Monama, 2006). According to Zvomuya (2005), the farm was bought and handed over to the community (Lephatsoana II Trust) but three years after transferring of land and rights the farm was none operational and none productive. The outsiders blame the community for letting the farm to fall into ruins while the community blamed the Trust for theft and mismanagement; on the other side the Trust is blaming the managers for being white and sabotaging government’s effort and squandering the funds while the managers are blaming the chief for misusing the funds. Zvomuya (2005: 62) reported “Today, it’s a ghost farm; its fields overgrown with khaki bush and deep erosion dongas disfiguring its once beautiful landscape”.

Strategic Partnership Model

The Oxford dictionary (1979) defines partner as “person associated with others in business of which he shares risks and profits.” This definition is giving a clearer background of most of the definitions that were given by different authors or writers. According to the Department of Land Affairs (1997: 39), “Private sector initiatives in land reform are partnerships between recipients of the settlement/Land Acquisition Grant and owners of private business, which broaden the base of land
ownership, offer security of tenure and raise incomes of the grantees. Eweg (2006) defines partnership “as a business entity in which partners or owners share the profits or losses of their investment.” Eweg (2006) went further to suggest a few important key elements should be considered for a successful partnership in farming business, which are also discussed by van Reenen et al (1995) as explained below:

(i) The partnership agreement should be well defined and be in a written form;

(ii) The contributions of each partner should be well defined and recorded for future reference; and

(iii) The method of remuneration should be clearly defined to avoid confusions and argument when is time to share the profit made or loss incurred.

Several examples exist of relatively successful joint ventures between land owners whose lands/farms are under claims and beneficiaries:

- Raats (2008) reported about a Mr Spencer Drake who owns plantations and one of the best modern sawmills in George’s Valley at Magoebaskloof in Limpopo Province who decided to go for a partnership with the beneficiaries of Magoebaskloof farms. He shared his knowledge, skills and expertise with the beneficiaries. He was later joined by his neighbouring farmer, who trained and mentors the beneficiaries running their business on timber treatment.

- According to Hofstatter (2007) two farmers who sold their farms to the land reform beneficiaries of Marulaneng at Hoedspruit in Limpopo Province formed a joint venture (Motelele Hoedspruit Land Claim Initiative) with the beneficiaries. They were quoted by Hofstatter (2007) whereby stating: “We wanted to sell some of our land to the government for this purpose, but without compromising on agricultural productivity.” They helped the community in identifying and registering the beneficiaries and the formation of the Communal Property Association (CPA). The partnership was established to last for a period of ten years, after which the CPA will buy them out and run the company as community property (Hofstatter, 2007).

- Phillips of Farmers Weekly (2010) reported that Ngcolosi Community at Kranskop in KwaZulu Natal has been given their land back through restitution in 2005 and decided to form the Ngcolosi Community Trust (NCT) to manage its properties. The NCT decided to form a farm management company, Ithuba Agriculture. The general manager of Ithuba Agriculture who is spearheading the development, improvement and production is suggesting the following tips that could bring about success on post-settlement of restitution farms:-

  - Partner with proven farming companies;
  - Employ experienced farm management team while developing the available staff through training and mentorship;
  - Maximise outputs through effective agricultural practices;
  - Make use of the experience of the successful land reform farms to set up a new farming ventures; and
- Good record keeping and accounting practices could be used when applying for bridging finance.

- The Transvaal Suiker Beperk (TSB) Strategic Partnership Model

TSB is one of the biggest sugar-producing companies in South Africa. It is situated on the east of Malelane town in the Nkomazi District of Mpumalanga Province. Some of its farms (notably sugar cane farms) were part of the biggest restitution claims of Tenbosch in Mpumalanga Province. The Siphumulele Community (formed Siphumulele Tenbosch Trust) and the Ingwenyama Community (formed Ingwenyama Simhulu Trust) are two of the communities that have benefited from the Tenbosch restitution. They realized that they lack proper knowledge and skills on the management of sugarcane farming, especially on different production aspects such as fertilizers, irrigation, etc. as well as harvesting of sugarcane. With this in mind they entered into a partnership agreement with TSB through their respective Trusts. TSB entered into a partnership with the Trusts through its Agricultural services company known as Shubombo Agricultural Services (Chiyoka, 2009). The partnership agreement was clearly defined whereby each partner’s contribution was clearly stipulated. According to the agreement each contributed 50% membership towards the formation of the Mgubho Farming Services.

3. METHODOLOGY

According to the introductory discussion it is clear that a large number of land reform projects have failed in South Africa because of poor governance structures and with little or no post-settlement support or after care services to the beneficiaries. The following contributory factors have been identified and outlined by Kressirer and Ngomane (2006) in post land reform areas of Mpumalanga and Limpopo Provinces namely:

- Limited technical farming expertise;
- Poor physical infrastructure;
- Poor access to finance;
- Limited farm management expertise; and
- Poor organizational arrangements and leadership skills

In 2005 the Chief Land Claims Commissioner requested the Centre for Land Related Regional and Development of Law and Policy at the University of Pretoria, and the Centre for Property Studies in New Brunswick, Canada to develop an evidence based settlement and support strategy for land agrarian reform in South Africa to assist people regaining land rights through the restitution process. Two land restitution claims were identified namely Mashishimale in the Limpopo Province and Nkumbuleni in KwaZulu Natal Province in South Africa.

This paper draws data from two related case studies undertaken by the authors to determine the essential elements of two post-settlement support models to successfully implement and manage
sustainable land reform projects: namely Mashishimale farm management model and Nkumbuleni strategic partnership model.

The following specific objectives were set for the study:

- To describe two different models with regard to land restitution; and
- To determine the factors that led to failures and/or successes in each model.

A semi structured questionnaire was used to collect data at the several meetings held with the representatives of the Community Property Association; Community Trust; Beneficiaries (community members); The Tribal Authorities (Chieftaincy); Regional Land Claim Commission; Department of Land Affairs; Department of Agriculture (provincial level); Women Clubs; Consultants and other institutions of the Mashishimale and Nkumbuleni communities. A number of specific key questions were developed beforehand to ensure that relevant information was collected. This was followed by a focus group discussion held with the CPA and Trust members to understand the challenges being faced.

4. CASE STUDY 1: THE MASHISHIMALE COMMUNITY PROPERTY ASSOCIATION (CPA) – THE FARM MANAGEMENT MODEL

The Ba-Phalaborwa Ba Ga-Mashishimale tribe occupied the land they had claimed from time immemorial (SRS-SA, 2006). When the Ba Phalaborwa Ba Ga–Mashishimale community was removed, no compensation was determined or granted (SRS-SA, 2006). Following the forced removal, the claimants were allocated a small portion of land for residential purposes known as Mashishimale location. This land had also belonged to the Mashishimale tribe even before the surveying and demarcation, so the portion of land was not regarded as compensation (SRS-SA, 2006). As a consequence of the removal, the community lost the use and occupational right to the land they had occupied for many decades (SRS-SA, 2006). Prior to the dispossession they had grazing, hunting and burial rights, which were all lost as a result of the removals. With the arrival of white people, the Mashishimale community were turned into labour tenants and those who refused this practice were expelled from the farm (SRS-SA, 2006). The land is currently used for ecotourism, game farming with four of the big five, and citrus fruit production.

In 1999 the community lodged a claim with the Limpopo Regional Land Claims Commission (RLCC) in Limpopo in compliance with section 11(1) and 2(1) of the Restitution of Land Rights Act of 1994 for 35 350 hectares of land. The claimant community was comprised of approximately 1 885 households who could trace their ancestry to the original inhabitants, plus 99 other households who had migrated into to area after the forced removals (SRS-SA, 2006). The Ba Phalaborwa Ba Ga-Mashishimale community chose restoration of the land where restoration was feasible. Where restoration was not feasible they chose financial compensation (SRS-SA, 2006). The owners of the farms were willing to sell 16 353 hectares back to the community, while the remaining 18 997 hectares are still in the process of being transferred. The 16 353.2 hectares of land were valued at a total of R148 620 000 (SRS-SA, 2006).

The land claim was published in the Government Gazette no. 23274 on the 5th April 2002 as notice 501. The claimed land comprised of the farms Hope 149KT, Bosbok 793 LT, Ram 799 LT, Brand 789 LT, Glip 797 LT, Punt 151 KT, the remaining extent of the farm Ziek 771 LT, the remaining extent of the farm Brook 772 LT and the remaining extent of the farm Breakfast 773 LT. The Community Property Association (CPA) was established in 2004.
4.1 Structure and responsibilities of Mashishimale CPA

According to White Paper on South African Land Policy, a CPA could be defined as, “Legal body through which members of disadvantaged and poor communities may collectively acquire, hold and manage property in terms of a written constitution” (Department of Land Affairs, 1997: 51). The CPA must draw up the constitution which will help to provide good governance and management of the properties. Department of Land Affairs monitors the role and progress made by the CPA after it has been registered with RLCC. The Mashishimale CPA structure comprises of the following positions:-

- Chairperson;
- Deputy Chairperson;
- Secretary;
- Deputy Secretary;
- Treasurer;
- Three (3) Additional members;
- Two (2) Ex-officio members (TA member and the Chief).

Responsibilities of the Mashishimale CPA

- Manage all the properties/ projects on behalf of the community and report progress and challenges;
- Manage the finance and prepare all the necessary reports;
- Continue with claiming of the remaining lands, still outstanding;
- Arrange and organise community and stakeholder meetings;
- Represent the community in all other meetings;
- It is the decision making body;
- To create jobs;
- It serves as a link between the community and other stakeholders;
- Appointment of knowledgeable, skilful and experienced CEO and farm managers; and
- Establish a Finance Committee and two (2) steering committees.

The perceived success of the Mashishimale CPA

- The salvaging of the falling citrus farm by appointing a knowledgeable farm manager.
- Appointed a skilful manager to revive the Game Ranch;
- Apply successfully for a production loan from an Exporters Association;
- Communication channels and cooperation with the community is smooth and there is trust among all role players; and
- Working relationship with the TA, RLCC and community is a success.

Challenges and problems identified/ experienced after settlement

- The former land owner moved out of the farm without notice, the commissioner was informed but did not react. The farm was three (3) months without maintenance;
- There were no fertilizer, pesticides, pumps were not working, and irrigation could not take place.
- No money to pay farm workers their monthly salaries;
- The community cattle owners (farmers) wanted land for grazing and herbalists wanted permission to enter the farm to collect medicinal plants for their medicines;
- The post settlement payment was delayed and as such affecting the operational program and payment of farm workers; and
CPA members did not receive any training on farm management.

**Financial management and support**
- There is a Steering Committee responsible for the finances and to report to the CPA;
- The CEO keeps all financial records (purchases and payments), however there is no actual financial system in place; and
- The CPA is not prepared to sign any documents and also to stand for any surety for financial loans. Due to frustration, the CEO and Game Ranch farm manager have stand for surety for the loans in their private capacity.

**Interim Business Plan**
- An interim business plan was developed with the assistance of the Project facilitator/coordinator and Agricultural specialists from University of Pretoria;
- A knowledgeable and skilful farm manager was recruited to manage the citrus farm; and
- Capital investment for Croc Ranch in order to operate effectively is estimated at R4 160 000.00.

### 4.2 Meeting with community stakeholders and structures (roles, needs and expectations)

**a) Meeting with the Tribal Authority (TA) Chief and the Council**
- They helped to lodge the land claim;
- The Chief help to transport committee members to meetings; and
- Encouraging community and business people to make financial contributions in the community.

**b) Meeting with business people (women)**
- There is a group of people in the community that is going all the way out to make a living out of small businesses. However selling the same products within the community where they stay, competing against one another.
- The women and men making handicrafts need urgent support for the establishment of a site at the entrance gate to the Kruger National Park.
- They use social grants to buy materials and other products to either make handicrafts or to resell them to their fellow community members.

**c) Meeting with community elders**
- The community elders were crucial in the identification of the significant areas; and
- They also help in the formation of the family trees.

**d) Meeting with religious people**
- It was noted that there was only one church member who attended the meeting. He indicated that it was very difficult to raise funds within the community which is already in the deep end of poverty.

**e) Meeting with social clubs**
- The social clubs include the Burial Societies; and
- One of the social clubs is a Stokvel society wherein members of that society contribute R100.00 as a monthly subscription.

**f) Meeting with traditional healers**
- Traditional healers made it clear that they want access to the farms to collect medicinal plants (muti);
- They would like to perform rituals for their ancestors who were buried in those farms;
- They indicated that they can collect medicinal plants from certain areas but they experience transport problems;
• Medicines can only be prepared on an open wood fire and as such there is a need to have access to fire wood from the farms; and
• As a group they are interested to grow medicinal plants in a nursery.

g) Meeting with cattle owners
• They need the land for ploughing and plant crops and the need of land for grazing for their animals (cattle, goats, sheep, etc.); and
• There is no grazing management system in place and there are no fences that could help them to control grazing of animals.

4.3 Meeting with project facilitator/coordinator

SRS-SA appointed Womiwu Rural Development which in turn appointed an independent consultant as a project facilitator/coordinator to assist the CPA. The facilitator was coordinating the project functions such as training (capacity building on governance, management and finance), building and maintaining good working relationship with the stakeholders.

i) Profile of the Project facilitator/Coordinator
- Agriculturally educated with farming experience.
- A person with trainer/mentor knowledge and experience.
- An experienced person with skills to work with people.

ii) Specific role and functions
The Project Facilitator/Coordinator became part of the project by being an independent person to make a difference, render support to the project and make it successful and to coordinate all the SRS-SA activities.

BOX 1: FUNCTIONS OF A PROJECT FACILITATOR/COORDINATOR:
- Assist in information gathering for the long term community strategic plan;
- Assist in information dissemination within the community as determined by the provincial coordinator concerned in consultation with the relevant Land Claim Committee;
- Compiled an inventory of current and past plans and documents that had been developed for economic development activities for the relevant communities;
- Drafted a monthly work plan (objectives, activities, deliverables and time frames);
- Liaise with local structures;
- Engage with structures on issues of concern with the community;
- Engage with claimants who were awaiting restoration of their land rights;
- Identified and compiled database of various community projects and individual businesses;
- Conduct and compiled a community skills audit and database;
- Assist the community members in developing and applying for grants for the projects;
- Work with other community coordinators to determine the needs of the community with regard to the land the community received or would receive through the restitution;
- Work with other community coordinators to draft a detailed community profile;
- Assist in drafting and developing a proposed land development plan;
- Facilitate capacity building and training workshops for the beneficiaries; and
- Monitor and evaluate the progress made through the duration of the programme as well as at the closing phase of the programme.
iii) **Observations made by the Project Facilitator/Coordinator**
- The community is aware of what is happening on the farm;
- The community identified other needs that need to be addressed;
- The role of the Chief in the CPA should not be underestimated;
- The RLCC did not really do what was expected and promised to the community through the CPA, always giving excuses; and
- The financial challenges of the CPA were not addressed.

iv) **Lessons learnt by the Project Facilitator/Coordinator**
- The RLCC made promises and create expectations that seldom fulfil;
- Community members have divergent views and perspectives on land use which must be catered for accordingly;
- The aims and objectives of each project must be communicated properly to the community;
- There is no feedback from government officials or structures to the broader communities;
- Not all the deliverables are attainable (need to be more flexible);
- The FMM is replicable; it could be used at other places; and
- The beneficiaries have insufficient funds, or no funds and expertise to manage the farm effectively and efficiently.

4.4 **Meeting with executive of farm**

a) **Chief executive officer**

i) **Management responsibilities**
- The CEO is the senior manager of the entire Mashishimale farm business. All managers of different sections report to him; and
- He is responsible for ensuring good financial management keep all purchasing, payments and other financial transaction records.
- The management of the farm business meet regularly with the Steering Committee (Finance) of the CPA;

ii) **Identified problem areas**
- No job description as CEO, making it difficult to execute functions properly;
- No specific meeting schedule or plan with his managers (ad hoc);
- No actual financial system in place; and
- CPA is not prepared to sign documents and stand surety for financial loans.

iii) **Recommendations by the CEO**
- The development of job descriptions demands urgent attention;
- CPA is responsible to apply for loans not the managers/workers; and
- CPA members need to be trained on the basic principles of all business activities.

b) **The Game Ranch Manager**

i) **Management responsibilities**
- The Game Ranch manager resigned as CPA member when appointed as Game Ranch manager.
- He does not have any previous experience in terms of game farming. His willingness and commitment to the business is his drive;
- 27 staff members under his supervision and they meet once a week;
• Managers’ report directly to the CEO. No specific meeting program or schedule;
• Game Ranch manager attended an intensive six weeks Veld Rangers Training program in the Kruger National Park and nominated as the best trainee; and
• CPA meets with the community on quarterly basis. Meetings are well attended and young people form part of the meetings;
• A Development Committee was established responsible for development aspects specifically for the development of the youth.

ii) Identified problem areas
• Meetings with CPA are frustrating especially with finance, decisions making is slow and committee members has very little knowledge about the farming business;
• Staff members (like other managers and the CEO) do not have job descriptions; and
• The casual workers received a salary which is below the minimum wage as described in the Labour Act.

iii) Recommendations by the Game Ranch Manager
• The development of job descriptions are essential;
• A structured meeting program between the CEO and two managers needs to be implemented;
• There is need to establish a nursery to grow medicinal plants for the traditional healers;
• Meet with SANPARKS to discuss the possibility to open a shop at the Phalaborwa gate to the Kruger National Park; and
• The development of cultural village as part of a full eco-tourism project needs urgent discussion and planning.

c) Mogotle Citrus Farm and Pack House Manager
i) Management responsibilities
• 32 full-time staff members under his supervision.
• Ensure that staff members have to be registered in terms of the necessary legislation;
• Farm workers must sign worker’s contract with the management as soon as possible;
• Workers’ Committee which meet once a week to discuss among other issues training needs, tasks, reporting, challenges/problems;
• The manager is providing the in-house (in-service) training; and
• Responsible for all citrus farming operational activities.

ii) Identified problem areas
• The manager is not involved in the long-term strategic planning of the farming business;
• Meetings with the CEO are not official, ineffective and unstructured;
• The manager recruits people from the community to work on the farm, but they were not interested.
• Experience serious financial problems to manage the farm and pack house effectively;
• 10 essential vacancies at the farm, which need urgent attention;
• The manager needs to join farmers’ study group to improve his knowledge and skills;
• The development of a Workplace Skills Plan for all staff members;
• There is no career path and job description for the staff members;
• There is insufficient irrigation water available at the farm; and
• The dilapidated pack house and irrigation system need urgent repair.

iii) Recommendations by the Mogotle Citrus Farm and Pack House Manager
• He has farming experience but needs support in a form of a mentor;
• He should stay on the farm to be able to manage all activities effectively and efficiently;
• The development of job descriptions and workplace skills plans needs urgent attention; and
• A structured meeting program should be developed and implemented between the CEO and two farm managers.

4.5 Post settlement support
The following role players played a role in the post settlement support of the Mashishimale community.

• Agricultural Extension services
• Local municipality officers are non-existence.
• Limpopo PDA
• CPA is not familiar with the extension services from the extension officers of Limpopo Department of Agriculture.
• Community organisations
• There are no Community Based Organisations that are rendering support services except the Traditional Council and traditional healers.
• SANPARKS
• SANPARKS has promised to supply game for the game farming, but nothing happened.
• Other Government Departments
• The local structures such as Local Government are only coming when invited and talk about Integrated Development Program but there is absolutely no delivery at all.
• Phalaborwa Mining Company
• Phalaborwa Mining Company has promised to adopt the farm, but nothing happened.

4.6 Job creation
• The CPA is looking forward to bring about development and improvement of the people of Mashishimale by upgrading of school buildings, roads, clinics, houses for the poor and also to save money for education trust.
• The game farm, citrus farm and lodge have opened job opportunities for the Ba-Phalaborwa community.

4.7 Communication channels or systems
The CPA had a very strong and reliable communication pattern namely, quarterly mass meetings with the community while urgent matters are sent to the community through the radio and notices or the community announcer.

4.6 Specific training needs
The broader community requires training in production management and procedures, marketing strategies, leadership, project management, financial management, and conflict management.
5. CASE STUDY 2: THE NKUMBULENI COMMUNITY TRUST – STRATEGIC PARTNERSHIP MODEL

The Nkumbuleni Community consists of 250 households who were removed from the land but only 211 households were verified whereby approximately 20% is headed by women (SRS-SA, 2008). The community established the Nkumbleni Community Trust (CT) three years before the land could be transferred to them. The community made claims for a number of farms but they could only be given the following few farms because the other farms were disputed by the current owners.

Table 5.1: Farms and portions of farms given to Nkumbuleni Community

<table>
<thead>
<tr>
<th>Portion</th>
<th>Farm and portion</th>
<th>Size in ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Tala 16135</td>
<td>308.24ha</td>
</tr>
<tr>
<td>4</td>
<td>Leeuwoort 1120</td>
<td>169.07ha</td>
</tr>
<tr>
<td>7</td>
<td>Leeuwoort 1120</td>
<td>323.34ha</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>800.95ha</td>
</tr>
</tbody>
</table>

5.1 Structure and responsibilities of community trust

Structure of Community Trust (CT)

This legal body is entrusted to hold and manage the land or properties of the groups of people or communities on their behalves. The Trust does not have its own constitution and it is currently using the Trust Deed to guide its functioning. The structure of the CT consists of the following portfolios:

- Chairperson;
- Deputy Chairperson;
- Secretary;
- Deputy Secretary;
- Treasurer;
- Public Relations’ Officer;
- Chaplain; and
- Additional members (6)

Responsibilities of the CT

- The main role of the CT is to manage the property on behalf of the community;
- The CT has to ensure that the project progresses well;
- The CT also strengthened the relationship and cooperation with the partners and other stakeholders;
- The chieftainship is also often informed about all the development and related activities at the projects;
- This is the decision-making body that is also responsible for the organisation of meetings and dissemination of information; and
- It is also responsible for the settlement of outstanding claims on behalf of the community.

Perceived success of the CT

- The CT has managed to attract and appoint the strategic partner;
- It is following up on the remaining land claims;
• The strategic partner successfully brought the failing farm to its normal production state.
• The strategic partner model is a pillar of strength and success for the farm;
• There is a good working relationship with all the role players;
• The communication channels with the community is smooth and it is bringing about strong support and trust to the CT.

Challenges and problems identified after settlement
• The election of the CT members was not democratically done;
• The community members are staying far away from the farms;
• There is high rate of theft, especially farm equipment;
• The farm demanded an absolute resuscitation with special attention to the deteriorated citrus production;
• The project need farm machinery such as tractors;
• The main challenge to address is a lack of funding and the knowledge about possible funding.
• The Trust has been struggling to access funding from the government but all in vain;
• The strategic partner injected R2 800 000.00 which has rescued the project;
• Members of the Trust have other commitments outside the project, and as such they compromise their time to fulfil their commitments at work and for the project to be successful;
• Promises made by the Department of Agriculture and Conservation with regard to funding have not materialised; and
• The CT is planning to select members from the community (especially the youth) to be trained as farm managers.

Financial management and support
• The Restitution Discretion Grants (R633 000.00) and Settlement Planning Grants (R303 840.00) for 211 households were applied for, but unsuccessful to date.
• A submission was made for additional funds (R2 400 000). The submission bounced back because of a problem in the structure.
• A grant to the value of approximately R632 449.00 has been paid to the Trust and this money was paid back to the strategic partner;
• There is no settlement plan and funding to manage the farms available;
• Nothing has materialized (within 9 months) with regard to the application for CASP funds.
• The only positive aspect is that the Department of Agriculture and Conservation identified the project as one of its flagships, but the support is rated zero.
• The irrigation system was upgraded with funds made available by the Strategic partner.
• It became evident that the Department did not use the business plan to develop a CASP financial plan.
• The strategic partner clearly indicated his frustration with the current situation; and
• The business company consists of 5 directors which include Trust members. It is however important that all Trust members and the community must clearly understand the role of the business company.
• Interim Business Plan
• The Project Coordinator and Agricultural Specialists from the University of Pretoria assisted the Community Trust to develop the Interim Business Plan (R500 000.00)

5.2 Meeting with Tribal Authority

The Chiefs helped and supported the motion to lodge the land claim with the RLCC. The elders of the community were allowed by the chieftainship to identify the historical areas that would serve as the evidence during the lodging of the land claim. The Chiefs and Indunas do not usually attend the meetings but they are kept abreast about the entire development on the projects.

5.3 Meeting with project facilitator/coordinator

A project coordinator was appointed to assist the community and the Trust to coordinate the project functions such as training (capacity building on governance, human resource management, and finance), linking, building and maintaining working relationships with other stakeholders. The project coordinator is playing a vital role in the current success of the project.

i) Profile of the Project facilitator/coordinator

• Agriculturally educated with farming experience;
• Project facilitator/coordinator has trainer/mentor knowledge and experience; and
• She has experience and skills to work with people.

ii) Specific role and functions of the Project facilitator/coordinator

• The project facilitator/coordinator became part of the project to make a difference, render support to the project and make it successful; and
• To coordinate all SRS-SA activities at the project level (detailed functions of the Project facilitator/coordinator: Box 1 )

iii) Observations made by the project facilitator/coordinator

• Elections of the Community Trust members were not democratically done;
• The CT committee is focusing only on one item, the farming business and citrus enterprise. Other enterprises are falling apart;
• Beneficiaries are staying far away from the farming project, which becomes an expensive exercise when people are supposed to go to work on daily basis;
• The CT committee is sometimes delaying issues which need urgent attention, which ultimately result in more damage to the project;
• In some instances the beneficiaries are taking advantage of the partnership and relax where it is not necessary to do so;
• The expenditure is not explained in detail and cash flow statement is too difficult for the beneficiaries to understand;
• The RLCC is contributing towards the failure of the project. It does not really guide people in terms of the necessary support that they need. They only come to the meeting when invited and stand to defend their superiors and their offices thereof;
• Government is only dealing with prescriptive documentations without proper assistance to the beneficiaries, there is nothing happening;
• The training that was done by the consultants was very much incompatible with the training needs of the community (and the language used during training was very difficult to be understood by the trainees/trustees);
• There is a dire need for the youth to be trained in different categories of governance especially training of facilitation skills; and
• It is the intension of the CT that all new farming projects will be implemented and managed by CT themselves and with the support from the community. The intension is therefore not to appoint a strategic partner for new projects.

iv) Lessons learnt by the Project facilitator/coordinator

• The community that does not have the relevant knowledge and suitable skills to provide any physical contributions to the project (“beggars are not choosers”);
• RLCC must release the appropriate funds in time. Too many excuses by the government officials defending their superiors;
• Government must provide initial training to the trustees in time;
• Farmers must be monitored by government before they leave or transfer their farms to the claimant beneficiaries or community; and
• Government must help to create and promote a good relationship between the former farm owner and the claimant community.

5.4 Meeting with strategic partner

Nkumbuleni formed a partnership with a knowledgeable, skilful and experienced neighbouring farmer. The following view points of the strategic partner on this partnership:

i) Establishing the partnership

The strategic partner offered two (2) possible ventures to the CT and the communities namely:

a) The community lease the farm to him; or
b) The farm is managed together as a joint venture.

The CT and the community decided to manage the farm together and form a partnership on the 50:50 bases and a legal contract was drawn and signed by both parties for a period of ten (10) years.

ii) Investments invested by the strategic partner

The strategic partner made his farming knowledge, management advice, tractors, equipment and transport available and invested more than R 2 800 000.00 in cash into the project. His main objective with regard to the project is to ensure that the Citrus farm must become the most successful farm in KwaZulu Natal Province.

iii) Factors strengthening the partnership

A positive and cooperative relationship has developed between the partners and they trust each other. Trustees have been trained by the strategic partner in business management and to be able to take over the business in the future.

iv) Stumbling blocks affecting the partnership negatively

The Government department’s promises financial support – but very little has materialized. The strategic partner is currently responsible for the running cost of the farming operation. He has to take a bigger share in the farming business and the community perceived it very negatively. There was a rumour that one of the families want to withdraw from the partnership. It has been noticed that there is a lack of willingness
among the trust members and broader community to learn and it is a known fact that an unwilling person can never be empowered.

v) The role of the stakeholders
The RLCC did attend meetings without making any positive contributions. No services were provided by the Extension service of the Provincial Department of Agriculture. The strategic partner makes use of the private consultants to advise them on technical farming issues.

vi) The importance of communication
The strategic partner emphasizes the good communication between himself and the trustees as critical and it does exist. It is further the trustees’ responsibility to communicate effectively with the broader community.

vii) Additional aspects affecting the success of the partnership
- The CT represents the community and their communication with the community is critical;
- The Project facilitator/coordinator who was appointed by the SRS-SA is a necessity to the project. She made things happen. She played a vital role and supported the strategic partner and the CT to build a relationship of understanding and trust;
- The strategic partner’s motto in life is: “how much can I make for other people” this is you must always be willing to help other people;
- The success of a partnership depends on a relationship, it is like a marriage;
- Both partners must have a love for farming;
- There must mutual trust between the partners (including the community); and
- It was not always possible to keep to the Interim Business Plan, but it did give clear directions and an essential element of any farming operation.

5.5 The interim business plan for Nkumbuleni CT

Agricultural specialists from University of Pretoria in close cooperation with the Strategic Partner and the CT developed an Interim Business Plan for the citrus farming enterprise. The project facilitator/coordinator was responsible for the communication of the plan to the broader Nkumbuleni Community. The Interim Business Plan addresses specific day to day needs and activities of the farming enterprise such as financial and production management, marketing management, and human resource management. The Interim Business Plan was followed by the Strategic Plan which was also developed by the specialists from University of Pretoria in cooperation with the Strategic Partner and the CT.

5.6 Post settlement support services

The following role players played a role in the post settlement support of the Nkumbuleni community:

a) Agricultural extension services
The Trust members are uncertain about the role that the division of Agricultural Extension can play to support them in their farming activities.

b) KwaZulu Department of Agriculture and Conservation
- An official from the Department of Agriculture and Conservation is attending meetings with the CT and the community;
- An application for CASP funds has been made but after a period of nine (9) months nothing has materialised; and
• A delegation from the Trust should meet with senior management from the Department of Agriculture and Conservation to clear all possible stumbling blocks as soon as possible.

c) **Other Government Departments**

• Department of Land Affairs (Rural Development and Land Reform) through The Regional Land Claims Commission has been coordinating the land claim for the community of Nkumbuleni;

• The RLCC is visiting the project and give advices where possible and necessary. They also attend to the CT and community monthly meetings especially when invited; and

• It has been noted by the CT that the release of funding is completely difficult and delaying. The delayed payment to the previous farm owner and/or the new owner(s) of the farms has been experienced as a serious factor responsible for the degradation of the farms. The RLCC assisted the CT in drawing up the terms and conditions of agreement with the strategic partner.

d) **Commodity organisations**

- Citrus Growers Association (CGA)
- No support was received from the CGA. The CT expected direct support from CGA hence they are supporting other citrus growers in the country.
- South African Sugar Association (SASA)
- CT could not identify any support from South African Sugar Association.

5.7 **Training and capacity building**

The community and the CT have not received any training either about governance or management of the farming business from government. There is no work place skills plan developed for the farm workers to build their capacity and skills.

5.8 **Job creation**

There were no specific jobs created except those that were for the people to work on the farm. However, it was mentioned that the farm is far away from the community and as such it is expensive for them to travel to the farm on daily basis. The Trust is planning to select some members of the community to be trained as managers, especially the youth. It does not have any development programme that is in place and functional.

5.9 **Communication channels**

The project coordinator communicates with the Trust members regularly through meetings. Trust members often invite the community for information and sharing of the development or progress made at the farm. The Chiefs attend the meetings whenever invited by the Trust.

5.10 **Specific training needs**

The Community requires training in production management and procedures, marketing strategies, leadership, project management, financial management, and conflict management.
6. CONCLUSION AND RECOMMENDATION

A. Farm Management Model: Mashishimale Community

The Mashishimale Farm Management Model has a definite management structure that was responsible for various activities on the farm. Three steering committees were established to manage Ngulube lodge; Game Ranch Safaris and Mogotle Citrus farm. The financial committee is responsible to manage the finance and prepare all the necessary reports which include financial and progress reports. A bookkeeper has been appointed responsible for audit of all financial books of the farm.

An Interim Business Plan (IBP) was developed with the support of the University of Pretoria agricultural specialists in cooperation with the CPA and CEO. The Interim Business Plan covers the marketing, operational, management, human resource and financial resource plan as well as SWOT analysis of the enterprises of Croc Ranch and Mogotle Citrus farm operations. The University of Pretoria agricultural specialists with the help of project facilitator/coordinate helped CPA to develop a financial plan which included capital investment estimated at R4 160 000.00 for Game Ranch, while Mogotle Citrus farm requires capital investment of R1 233 700.63 per annum.

The Mashishimale beneficiaries received support from CGA, even though it was on seasonal basis. Officials from the Department of Agriculture attended meeting on the farm when invited, but there was very little extension service rendered by Department of Agriculture (Provincial). SANPARKS rendered support by assisting CPA to buy clean buffalo. The Project facilitator/coordinate facilitated training (veld management, business management, and financial management) for the CPA and the Mashishimale community members.

The community was informed or invited to meetings, through the radio, written notices (that are often plugged at the busy centres such as taxi ranks and shopping centres), the councillors and the community announcers. The CPA held community mass meetings on quarterly basis whereby feedback was given and new mandates were taken. There was no communication with Department of Agriculture except when they were invited to a meeting. CPA met weekly with CEO and managers as per schedule.

B. Strategic Partnership Model: Nkumbuleni community

The Nkumbuleni Community Trust (CT) has appointed a strategic partner which together with Nkumbileni CT formed a company consisting of five (5) directors aimed to manage the farm as a business. There was no specific structure implemented at farm level. A legal contract is in place for a period of ten (10) years.

An Interim Business Plan was developed with the support of the University of Pretoria in cooperation with the CT, the Strategic Partner and the farm manager. The Interim Business Plan included the upgrading of the irrigation system, a pack house, development of additional 10 ha of citrus and 100 ha sugarcane. The financial plan included the upgrading of 80ha irrigation system (R1 3000 000.00), pack house (R500 000.00), development of 10ha citrus (R600 000.00) and 100ha of sugar cane (R1 500 000.00). The CT has applied for CASP funding, but their application was only approved a year too late. CT has successfully applied for Restitution Discretion Grants and Settlement Planning Grants of which R632 449.00 was paid to them. The Strategic Partner invested R2 800 000.00 to rescue the citrus enterprise.

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There was no support received from the Citrus Growers Association (CGA). An official from the KZN Provincial Department of Agriculture and Conservation was attending meetings with the CT and the community. No extension service was rendered by Department of Agriculture and Conservation. The Project facilitator/coordinator facilitated training (capacity building on governance, human resource management, and finance) and helped the CT to develop good governance structure.

**The following recommendations are made based on the findings of these two case studies:**

**Farm Management Model**

To successfully implement the FMM the following activities are essential:

a) Baseline study

The execution of a baseline study to determine the socio-economic situation in the community (beneficiaries) is inevitable. This task is the responsibility of the Provincial Department of Agriculture and the extension advisory service.

b) Appointment of an independent Project facilitator/coordinator

The Department of Rural Development and Land Reform should seriously consider appointing a Project facilitator/coordinator to support the management and community for at least two (2) years period.

c) Management structure

- A well-defined management structure needs to be established. Clear job descriptions are non-negotiable.
- The farm management structure must have authority to approve requests by the farm managers for purchasing farm inputs without unnecessary delay.

d) Business plan

The development of a business plan for the farm is essential. The business plan must include the following:

- Financial plan for the farm
- Production plan (including a marketing plan)
- Natural resources plan
- Resource management plan including the enterprise plan
- Human resource plan (including the work place skills plan)
- Risk management plan
- Infrastructure and equipment management plan

e) Post settlement support

The management have direct access to a professional extension advisory service. The appointment of a Departmental professional extension advisor and or a production advisor from a commodity organisation is recommended. If the service is not available the appointment of a mentor is recommended. Where possible and available the farm management should join farmers’ study groups as a valuable source of information, skills and knowledge.

f) Financial support

The financial support to manage the farm is again non-negotiable. The business plan will indicate clearly what the financial requirements are to manage the farm. It is the responsibility of the Government departments to ensure that grants are made available on time and that a program such as CASP be available for every restitution farm.

**The Strategic Partnership Model**

To successfully implement a SPM the following activities are essential:

a) Baseline study
The execution of a baseline study to determine the socio-economic situation in the community.

b) Appointment of a Project facilitator/coordinator
The Department of Rural Development and Land Reform should seriously consider appointing a Project facilitator/coordinator to support the management and community for at least two (2) years period.

c) Management structure:
- A well-defined management structure needs to be in place.
- The appointment of a knowledgeable, skilful and experienced partner is essential.
- The CT and Strategic Partner must sign an agreement as contract (Business Trust and German International cooperation, 2011: 23). This will strengthen the relationship between the community, their representatives and the Strategic Partner.

d) Business Plan
The development of a business for the farm is non-negotiable (see point 7.2.1. d) above).

e) Post-settlement support
It will be necessary for the CT that in conjunction with the Strategic Partner determines his/her need for settlement support such as professional extension advisor, a consultant or a mentor.

f) Financial support
The financial support to manage the farm is non-negotiable. The business plan will indicate clearly what the financial requirements are to manage the farm. It is the responsibility of Government departments to ensure that grants are made available on time and that a program such as CASP be available for every restitution farm.

Based on our experience and the findings the following pillars of success for a land reform project are recommended (Box 2):

Box 2: Pillars of success for land reform

a) Important to appoint management with appropriate expertise (well trained, skillful, knowledgeable and experienced).
   i. The partner or manager should have a proven farming experience.
   ii. Develop the skills of the available staff through in-service training.
   iii. The manager or partner should be introduced to the chieftainship and community as soon as the appointment process has been finalised.

b) The benefit stream that should be earned by both parties should be clearly defined and ensure that all parties understand and agree to avoid misunderstanding and misconception in the future.

c) There should be a strategy to develop service suppliers especially from the beneficiaries, especially when some of the services (building construction and servicing machinery) could be provided by members of the beneficiary community.
   i. CPA/Trust should be regarded as a CBO in its nature and as such it requires that is should be formed by bona fide members of the community. Identify specific channels of communication and develop a communication policy that will outline the communication strategy.

d) Establish and maintain good relationship between partners while encouraging very strong collaboration and cooperation between CPA/Trust, TA and other stakeholders.
The community should be given feedback on progress especially on HR and contract matters that the company might be engaged with.

i. Organise regular community meetings to report on finance to avoid speculations and misconceptions about project management.

f) The needs of the community should be catered for to avoid division among the community members.

g) The farming business must be treated as a commercial business in order to maximize outputs through effective agricultural practices, which maximize income.

h) Make use of the experience of the successful land reform farms or projects to set up new farming ventures that could be helpful to business. Ensure good record keeping and accounting practices that could be used whenever applying for bridging finance with financial institutions.

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REVIEW OF A SUCCESSFUL LAND REFORM BENEFICIARY PROJECT RESULTING FROM CO-ORDINATED SERVICE DELIVERY WITHIN THE SOUTH AFRICAN SUGAR INDUSTRY.

Nkala, J. & McElligot, D.  

1. INTRODUCTION

The South African sugar industry has long recognised the need to promote diverse ownership of agricultural land under sugarcane cultivation and has a range of support instruments in place to sustain initiatives aimed at changing the ownership profile of sugarcane land. To reach the target of 30% black ownership of freehold sugarcane land by 2014, the industry established an independent land reform entity, called Inkezo Land Company in 2004. Inkezo’s primary objectives were to streamline transfer of ownership of land to black farmers and promote the sustainability of the new ventures through targeted support services. The transfers have resulted in a growing number and different groupings of Land Reform beneficiaries i.e. New Freehold Growers, Pro-Active Land Acquisition (PLAS) and restitution or redistribution acquisitions through the Department of Rural Development and Land Reform (DRDLR). The Extension service of the South African Sugarcane Research Institute (SASRI) continues to play a crucial role in ensuring that all land reform beneficiaries adopt sound agricultural practices to promote sustainable cane production in the various cane supply areas of the South African sugar industry.

In many instances, the land reform projects are hampered by social, financial and agronomic issues which negatively impact on the general running of the farm and result in a reduction of sugarcane production. There are often unrealistic expectations by both industry and Government stakeholders of land reform beneficiaries, especially when there is a general lack of agricultural knowledge and financial management amongst this sector of farmers. It has been recognised that, through a collective effort by the relevant industry and Government stakeholders, these critical issues can be resolved. For example, the South African Sugar Association’s Land Reform department plays a central role in socio-economic issue resolution through facilitating discussion amongst Government and the beneficiaries, different communities and trustees and operating companies. In addition, the South African Canegrowers Association (CANEGROWERS), SASRI Extension and the milling companies work closely together towards enabling communities to meet financial and agronomic challenges.

2. CASE STUDY: UMZIMKULU MILL SUPPLY AREA, SIKHUTHELE COMMUNITY TRUST FARM

2.1 Background:

Mrs Khanyi Mkhanyawo, who is an educator by profession together and without any agriculture knowledge together with 40 beneficiaries were allocated 641 hectare farm through government Pro-Active Land Acquisition Strategy (PLAS) in 2009 without any agricultural knowledge. One year later Khanyi attended the Senior Certificate Sugar Cane Course in Mount Edgecombe and work on the farm began earnest. Through her passion for farming and willingness to implement advice provided by various stakeholders, Mrs Mkhanyawo has become a model farmer.

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38 South African Sugarcane Research Institute, P/Bag X02, Mount Edgecombe, 4300, South Africa. Tel: 039-975 1149 Fax 039-975 2078/9. joe.nkala@sugar.org.za.
39 South African Sugarcane Research Institute, P/Bag X02, Mount Edgecombe, 4300, South Africa. Tel: 039-975 1377 Fax 039-975 2078/9. Dirk.McElligot@sugar.org.za.
2.2 Materials and Methods

The general objective is to collect cane yields for the Land Reform Growers in the South Coast Area of KwaZulu Natal and then be used to compare with Sikhuthele Community Trust Farm. The methodology is implemented by establishing Project Operational Committee which will is used as extension tool for the adoption of Better Management Practices (BMPs) on the farm. The Project Operational Committee methodology was implemented at Sikhuthele farm in the Umzimkulu area, as follows:

Step 1: In consultation with DRDLR and Sikhuthele Community Trust directors, stakeholder roles and responsibilities were defined in accordance with the Sugar Industry Land Reform structure.

Step 2: A mentee was identified and was linked to training and thereafter assigned a mentor through the Department of Agriculture and Environmental Affairs (KZN DAEA) mentorship programme.

Step 3: An agronomic assessment was conducted to explore potential for both areas that had cane that was abandoned as well as new expansion/new development and it included a soil assessment. The new development area was 6ha of the total farm area and the permission to change the land-use had to be obtained from the Department of Agriculture and Environmental Affairs (KZN DAEA).

Step 4: Finance was acquired for the project by extension specialist from a relevant stakeholder. This included finance from the KZN DAEA and Department of Rural Development and Land Reform (DRDLR) for land preparation, seedcane, fertiliser, herbicides and farm equipment; SA Sugar Research Institute for soil sample analysis and technical training skills.

Step 5: The SASRI Extension Specialist organized in house Project Operational Committee meetings which included field days.

Figure 1&2: The Sikhuthele soil forms, Glenrosa and Catref, with 1.2 and the latter 0.7 metre rooting depths.
2.3 Results and Discussion

2.3.1 Agricultural Development

The Project Operation Committee was established in 2009 and 60ha was planted with variety N39. The crop was well managed and produced high quality cane which was sold to Ummzimkulu Mill. Operational Committee has been established and implemented in most of Land Reform Community Projects with regular meetings and feedback sessions between growers and extension staff. This same programme of work could now be rolled out on all Land Reform projects. Credibility of the extension staff has improved as the growers were able to witness the viability of sugarcane as a crop and see the income received. Six Project operational committee meetings/field days were held throughout each year with Board of Trustees, Directors and other stakeholders attending. This resulted in increased awareness of the production potential of the local natural resource base and site specific varieties.

2.3.2 Adoption of new technologies:

The Operational Committees methodology for each project increased awareness as to the importance of good agricultural practices such as land use planning, good field layouts to protect land from runoff and erosion, conservation structures and their role in surface water management, the use of herbicides, new varieties, the value of soil sampling and correct fertilization, pest and disease control as well as the value of pest and disease inspections, which have to be paid for by the growers. Business skills were also developed and adopted. A distinct change was noticed in the move from hand weeding/ hoeing to the acceptance of chemical applications of herbicides. The importance of soil sampling for accurate fertilizer applications was also recognized. A change from “old” varieties to more recently bred, higher yielding varieties was accepted and the role of research and technology development in agricultural improvement was appreciated.

Training materials for each Operational Committee meeting/field days have been developed for use by extension staff in English and Zulu as well as leaflets and other information packs to be distributed to growers.

2.3.3 Economic benefits:

Seedcane savings: the availability of on farm produced seedcane (as opposed to having to purchase and transport seedcane from neighbouring growers) of a suitable variety for local soil forms, resulted in a minimum of 30% savings in this input cost. The cost benefit of locally produced seedcane is one of the most direct methods of reducing input costs for land reform growers.

Weeding costs: the change from hand weeding to herbicide application resulted in a 60% savings in labour. Normally, 1 hectare requires 9 labourers for 5 days at R69.40 per day totalling R3123, while the cost of herbicide and application by knapsack requires 3 labourers for 3 days at R69.40 a cost of R8 30.54. This excluded additional savings in time and the improved yield due to good weed management.

Yield: The Sikhuthele farm yielded 599.66 tons or 59 tons per ha in 2011 and 2012 the yield increased to 2338.16. Other land reform growers in the South Coast declined from 7 728.58 tons in 2009 to 2593.42 tons. The yields from the Sikhuthele farm were 26% higher compared to Siyaphumula and Bidla which were 34% down and clearly showed the value of good crop management and better suited varieties for the local soil type.
Expansion of the area under sugarcane: It began with 60 hectares in 2009, a further 2 ha in 2010 and the 54 hectares in 2012. 2010 resulted in revenue of R20 887.20 per hectare or R348.20 per ton and R19 594.73 per hectare or 420.61 per ton in 2012.

After 3 years, the grower used his income from selling sugarcane to the mill to supply all of his input costs since he is now a commercial grower i.e. He has become an independent, commercially viable, technologically sound grower who can contribute to the economy.

2.4 The Value of this Extension Methodology:

Operational Committee and Study groups meetings have had significant value in identifying and optimizing natural resource potential in the Umzimkulu, Sezela and Eston Mill supply areas. The extension methodology described above has been implemented in other areas of Umzimkulu, Sezela and Eston Mill areas and has resulted in significant improvement of yields throughout the area. This trend is due to increased involvement by the mill, commitment by extension staff and growers and the extension methodology described above. Figure 3 shows the trend in improved yields since the implementation of this type of extension methodology.

![Sikhuthele Community Trust Farm](image)

Figure 3: The production history of Sikhuthele Community Trust farm in the Umzimkulu mill supply area.

By comparison, in an area where there is no Project Operational Committee and training has been sporadic, the trend (Figure 4) has been a slow but consistent drop in production over the past 4 years. This loss of production can be attributed to many reasons, some of which are the lack of training, lack of replant and ratoon management, non-availability of on farm-produced seedcane, non-adoption of newer and better performing varieties and a poor awareness of the natural resource base.
Figure 4: The production trend in Sezela Land Reform Community farms showing a downward trend in yields.

Figure 5: The production trend for Sezela Land Reform individual showing a downward trend in yields.
3. **CONCLUSION:**

Project Operational Committees have shown to be significant in stimulating the adoption of research results, modern agronomic technologies, the conversion of a technical message to practical implementation and the ability for small growers to develop into sustainable commercial farmers. The key to this success is enabling land reform growers to identify and appreciate the natural resources and match the resource base to a suitable enterprise, particularly where opportunities and markets are already in place. The establishment and implementing of operational committee methodology has motivated the Umzimkulu, Sezela and Eston land reform growers to adopt better farming practices, establish on-farm seedcane nurseries to access cheaper disease-free seedcane and have the potential to significantly increase sugarcane supply to the mill. The operational committees have increased awareness of new varieties and served as a technical training facility. Relationships between local growers, technicians and the miller as well as the link to scientific research results have been strengthened. The project operational meetings act as a catalyst for development and higher economic returns, resulting in sustainable and improved livelihoods through creation of employment.

The methodology has shown that extension has a critical role to play in the development of sustainable, competent and economically successful growers. This process will lead to the successful implementation and continuation of land reform grower projects, if it is adopted with commitment by both extension and growers alike. The methodology can be applied to other commodities.

**ACKNOWLEDGEMENTS**

I would like to thank my co-author Dirk McElligott Extension Specialist for initiating Operational Committee and for his tireless dedication to South African Sugar Land Reform.

**REFERENCES:**


PEA/PDA AND THE DEPARTMENT OF AGRICULTURE LIMPOPO.

Muthala, K. S.⁴⁰ & Netshivhodza, K. M..⁴¹

1. INTRODUCTION AND PROBLEM STATEMENT

LDA (Limpopo Department of Agriculture) in partnership with GTZ (German Technical Co-operation) (GIZ) established a programme called BASED (Broadening Agricultural Services and Extension Delivery) aim at the re-orientation of the extension staff for them to become competent facilitators.

BASED was a bilateral Government project implemented by the Chief Directorate Operations of the LDA with the support of GTZ.

BASED was launched officially as LDA programme in May 1998. The first phase ended in July 2000. The second phase was approved up to December 2002.

BASED in relation to the South African-German country strategy was part of the focal area community development. The project play a contributory role in concept development for the agricultural sector in SA in the context of the GTZ supported rural development programmes.

The BASED mandate was as follows:

- To test participatory extension approaches in pilot districts with a selected number of staff of LDA acting as future trainers and approach managers.
- To test with farmers and with the support of research suitable technologies to increase production through sustainable use of resources and develop agricultural-based income generating activities.
- On the basis of successful implementation to establish mechanisms to facilitate the dissemination of the approach within the LDA and to the other Provinces.

In 1998 the Limpopo Department of Agriculture began to develop a participatory extension approach (PEA) to ensure that agricultural services reach smallholder farmers and benefit their communities. PEA is a learning approach for strengthening the individual and organizational capacities of rural people. It enables them to deal with the dynamic challenges and changes to their livelihoods to move out of poverty. It seeks to address some of the major challenges to sustainability in pro-poor oriented development interventions.

Some challenges include:

- How to get communities organized to articulate their diverse demands?
- How to make people participate and monitor political processes?
- How to make people innovate and explore options for change?
- How to get vulnerable groups to benefit from development initiatives?

⁴⁰ Limpopo Department of Agriculture, P/Bag X2247, Sibasa, 0970. Tel: +2715 963 2005/6/7. Fax: +27159 963 1414. Email: muthalaks@agric.limpopo.gov.za / muthalaks@gmail.com

⁴¹ Limpopo Department of Agriculture, P/Bag X2247, Sibasa, 0970. Tel: +2715 963 2005/6/7. Fax: +27159 963 1414. Email: netshivhodzahm@gmail.com
• How to coordinate service provision at community level?
• How to improve local governance? How to move from isolated projects towards broader support to community development initiatives?

PEA is an approach that seeks to root development in a process of learning towards self-empowerment and collective action.

2. THE PROBLEM TO BE ADDRESSED

“LDA doesn’t respond sufficiently to the developmental constraints and opportunities of smallholder farmers”

2.1 THE PROJECT AIMS

• BASED aims at developing competency of extension staff and managers of the organisation in a client-specific service delivery.
• At field level BASED support district extension staff in helping smallholder farmers to articulate and aggregate their demand for agricultural services.

3. MAIN THRUST OF PEA BASED

PEA was focusing on the following main thrusts within the department:

• Case study development;
• Staff competency development in PEA;
• Development of innovation system;
• Approach development;
• Mainstreaming PEA within LDA

4. WHAT IS PEA?

[ ] A learning approach for the strengthening of the individual and organisational capacities of rural people and their livelihoods to be able to deal with the dynamic challenges and changes in development.
[ ] It builds on the “life world” of rural people who are having agriculture as a common foundation and spreads from this into other fields of development.
[ ] It facilitate a process of self-organisation and emancipation of rural communities to enable people to better articulate their needs for agricultural and social services and represent themselves vis-à-vis services providers and authorities.

5. WHAT ARE THE PEA CORE VALUES?

• Self-reliance;
• Ownership and control;
• Inclusivity and equal opportunities;
• Self-organisation of rural people;
• Sharing and co-operation;
• Building on local experiences and skills;
• Quality facilitation of learning;
• Conservation of natural resources.
PEA Pillars

- linkages and co-operation
- Village as an organisation
- Experimentation
- Learning from experiences
6. PEA TECHNICAL AREAS
   • Soil Fertility Management (SFM)
   • Small Scale Seed Production (SSSP)
   • Small Scale Livestock Production (SSLP)
   • Soil and Water Conservation (SWC)
   • HIV/AIDS Mitigation

7. INSTITUTIONALISATION OF PEA WITHIN LDA
   • In 2006 the GTZ left the Department of Agriculture Limpopo Province.
   • The process was led by the program manager from the provincial office and coordinators from the districts as well as the back stoppers from municipalities.
   • In 2007 PEA Methodology was then institutionalised in two colleges which are: Tompi Seleka and Madzivhandila.

8. THE IMPACT OF PEA IN PRACTICE
   • PEA/PDA was also introduced and implemented in other Provinces like Mpumalanga and Eastern Cape;
   • PEA was instrumental in the formation and strengthening of commodity groups in Vhembe district;
   • PEA promoted stronger cooperation and team work between researchers and Extensionists;
There was greater interaction between districts that were implementing PEA which promoted learning and sharing;
Farmers managed to produce open pollinated varieties that were sold around Limpopo province.
Farmers were mobilised for SFM and managed to bargain for lime, fertilisers and organic fertilisers and improved their soil nutritional status.
The process of PEA mobilised 118 villages at Blouberg Municipalities for livestock infrastructure development within 18 months.
Farmers managed to conserve soil and water
HIV/AIDS awareness creation workshops conducted in all areas were PEA was facilitated
More than 800 officers and farmer trainers were trained in PEA/PDA

9. LESSONS LEARNT
PEA/PDA approaches is a demand led driven type of service delivery and therefore it requires more commitment from both sides.
Roles of different actors should be clearly defined at the beginning PEA learning cycle.
The process can be utilized in all projects/programs of the LDA even beyond.
The process was effective when managed at Provincial level.
Well trained staff has the capacity to train others.
Farmer-to-farmer extension is a powerful tool for dissemination of innovations in agriculture
Farmer experimentation is an effective extension strategy for farmers’ emancipation
Strengthening and support of existing farmer groups enhance self-reliance, participation and inclusivity in service delivery
PEA was useful in strengthening commodity approach development
10. CHALLENGES FACING PEA
- Inability to sustain the good practice and promotion of PEA;
- Change departmental policies;
- Lack of funding to provide support to the implementation of PEA?

11. CONCLUSIONS
- PEA resuscitation in the districts to strengthen extension service;
- PEA could play an important role in promoting and strengthening commodity approach as it is implemented in Limpopo;
- Continuous re-training of Mentors and Back-stoppers is necessary;
- PEA has empowered Extensionists and Researchers who were exposed to it

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ABSTRACT

The study assessed the impact realised from the participation of farmers in the implementation of government’s farmer mechanisation support program through interviews of randomly and purposively selected farmers and traditional leaders respectively, and all available tractor operators using semi-structured interview schedule. Personal observation and experience realised by extension workers during program implementation was used in the interpretation of findings and formulation of conclusions. The study was conducted in Makhuduthamaga Sub-district in Sekhukhune District of Limpopo Province in South Africa. The study conducted a comparative analysis of two cases: Schoonoord and Moripane sorghum and maize belt respectively. The study found that when farmers play a leading role in implementation of agricultural development programs, such programs become successful and sustainable than when extension workers are in the lead. The study recommends active farmer participation approach in farmer development programs for sustainability through acquisition of sense of responsibility, ownership and self-reliance.

1. INTRODUCTION

The Limpopo Government Department of Agriculture (LDA) was supplied with 72 tractors by Department of Agriculture, Forestry and Fisheries (DAFF) as an input injection for Limpopo provincial farmer mechanisation support program, meant specifically for subsistence farmers in the province. The program was officially launched on the 13th of November 2012. The tractors were distributed among the five districts. Sekhukhune district received eighteen, four of which were allocated to Makhuduthamaga sub-district (Head Office & Sekhukhune Reporters, 2012).

A directive was then issued top-down to extension service that the program operations should be based in traditional authorities. Extension service didn’t have program policy framework for guidance on approaches to apply during implementation of the program. Only operational framework was in place for administrative directives. In essence, the program was implemented without a clear extension route map, and Monitoring and Evaluation system. This omission might have impacted on the choice of appropriate implementation approach on the one hand, and monitoring of the implementation and evaluation of the output of the program on the other. The program’s implementation in the Makhuduthamaga sub-district was then focused onto two separate areas of production, namely Schoonoord sorghum belt and Moripane maize belt. The areas were provided with ten tractors seven of which were loaned from other sub-districts and one tractor respectively.

According to Department of Agriculture (2005)’s Norms and Standard for Extension and Advisory Services in Agriculture, extension and advisory service should have clearly defined objectives, action

42 Senior Agricultural Advisor, Extension and advisory services, Limpopo Government Department of Agriculture, RSA. www.nkgodidiale.com, E-mail: nkgodidiale@gmail.com
43 Agricultural Advisor, Makhuduthamaga Sub-district, Limpopo Government Department of Agriculture, RSA.
44 Agricultural Development Officer, NEBO Service Centre, Limpopo Government Department of Agriculture, RSA.
45 Agricultural Development Officer, Schoonoord Service Centre, Limpopo Government Department of Agriculture, RSA.
plans, timelines, and deliverables. On the same note Palmer (2006) notes that a project must have five phases namely conceptual, planning, designing, implementation, and operation and support phases. It is during planning phase wherein budget allocation is defined. It is also during implementation phases that buying-in from participants is obtained. The main purpose of the exercise is to ensure commitment of the participants on the project implementation processes. The implementation teams’ understanding of the project dynamics is tested during the implementation phase. This is complemented by operation and support phase through which all other supporting resources are engaged into the system.

Survey, analysis, planning, execution and evaluation are part of extension programme planning *Nine Spokes of the Wheel* (Murton, 1965) through which extension services identify and analyse areas and farmers’ needs that need extension service’s attention, plan for the program execution, and evaluate the outcomes of the operations. Novafrica (2005) agrees from participatory point of view that survey and participatory need analysis, planning, implementation and evaluation are major steps of Participatory Development Approach (PDA) which emphasises participation of the role players as of critical importance. Kusek and Rist (2004) argue that the need to conduct a readiness assessment is very paramount for implementation of any public program. According to the authors’ argument, need and readiness assessments are two different concepts. Need assessment assumes that there is fundamental and underlying question about the program. Readiness assessment on the other hand assumes that the program is needed, and addresses whether or not the implementing agent is ready. Furthermore, Hart, Burgers and Hart (2004) argue that many agricultural development projects are implemented without clearly defined plan of action and/or management framework, and as a result, they seldom achieve their intended objectives. The question that remains is whether the extension service was ready for the implementation of the mechanisation program in respect of analysis and planning on the one hand, and the beneficiaries of such a program from participation point of view, on the other.

2. **PURPOSE OF THE PAPER**

*Evaluation* is the eighth spoke of the *Nine Spokes of the Wheel* and the last step of PDA through which extension service assesses its performance in addressing the areas of need identified during the survey, the first step of both approaches. The study therefore conducted evaluation to assess how or whether the extension service allowed active participation of farmers in the implementation of farmers support mechanisation program in the concerned area of study. The also seeks to look into the magnitude of farmers’ participation in the program in relation to the implementation thereof by extension workers. The purpose of the paper is therefore to highlight the impact of people participation in public programs for ownership, self-reliance and sustainability. The findings may assist in identifying appropriate extension approaches in implementation of such agricultural programs in future.

3. **METHODS**

The paper studied two cases, Schoonoord and Moripane sorghum and maize belt respectively. Sets of qualitative data were collected through a semi-structured interview schedule from 69 simple-randomly selected farmers, five purposively selected traditional leaders for their pilot status and active participation in the program, three of which responded, and all eight available tractor operators. The questionnaire was structured to address the participant’s role in and contribution to the implementation processes, and to highlight the impediments encountered and successes realised, as well as to solicit suggestions for future program implementation. The questionnaire also provided for any general burning issue that participants deemed noting. The qualitative coding analytic method
was applied to generate categories of narrative themes. Document review was also conducted on the program reports to complement the comparative analysis between the two cases. Personal observation of the extension workers that participated in the program implementation was used through unstructured interviews to clarify issues on the raw data, enhance interpretation of the findings, and to complement the drawing of conclusions of the study.

4. RESULTS

4.1 Farmers Participation

Farmers were expected to clean their respective lands off trees and shrubs as well as to hand broadcast seeds where planter operation was limited, as part of their contribution to the implementation of the program. The study found that farmers were not made to participate in the planning processes of the program’s implementation. As a result, the cleaning had not yet been done at the time of ploughing. The study found from farmers that traditional leaders dominated the program. As they were tasked to draw beneficiary lists, the lists were topped by their relatives. As a result, the majority of the traditional leaders’ clan including those that had not been ploughing their fields for sometime topped the beneficiary lists. The majority of the regular producers were excluded from the lists. The study found that farmers were not updated of changes, anticipated delays and/or breakdowns in time. Extension workers supplied inputs to farmers without advices about such inputs. Men were reported to have dominated and intimidated women in the field in fight for tractor services. Table 1 depicts the comparative analysis of farmers’ participation in the two cases.

Table 1: Comparative analysis of the two cases: Farmers Participation

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SCHOONOORD</th>
<th>MORIPANE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role in the field</td>
<td>Wait for tractors</td>
<td>Measure lands</td>
</tr>
<tr>
<td></td>
<td>Direct tractors to own land</td>
<td>Direct tractors to own land</td>
</tr>
<tr>
<td></td>
<td>Broadcast seeds</td>
<td>Broadcast seeds</td>
</tr>
<tr>
<td></td>
<td>Individual work</td>
<td>Team work</td>
</tr>
<tr>
<td>Contribution</td>
<td>Fuel purchase in 1 out of 4 villages</td>
<td>Transportation of fuel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supply of minor implement spares</td>
</tr>
<tr>
<td>Role of Extension Workers</td>
<td>Delivery of inputs</td>
<td>Delivery of inputs</td>
</tr>
<tr>
<td></td>
<td>Address meetings</td>
<td>Address meetings</td>
</tr>
<tr>
<td>Impediments</td>
<td>Tractor breakdowns</td>
<td>Tractor breakdowns</td>
</tr>
<tr>
<td></td>
<td>Insufficient &amp; late input supply</td>
<td>Insufficient &amp; late input supply</td>
</tr>
<tr>
<td></td>
<td>Insufficient number of tractors</td>
<td>Insufficient number of tractors</td>
</tr>
<tr>
<td></td>
<td>Traditional leaders unfairness</td>
<td>Traditional leaders dominance</td>
</tr>
<tr>
<td></td>
<td>Traditional leaders dominance</td>
<td>Extension workers’ absence</td>
</tr>
<tr>
<td>Successes</td>
<td>Many farmers benefited</td>
<td>All farmers benefited</td>
</tr>
<tr>
<td>Advice for future operations</td>
<td>Engage all role players</td>
<td>Increase fleet size</td>
</tr>
<tr>
<td></td>
<td>Mobilise farmers groups/coops</td>
<td>Empower the farmers group</td>
</tr>
<tr>
<td></td>
<td>Improve plough depth</td>
<td>Improve plough depth</td>
</tr>
<tr>
<td>Any burning issue</td>
<td>Men dominate/intimidate</td>
<td>Men dominate/intimidate</td>
</tr>
<tr>
<td></td>
<td>women in the field</td>
<td>women in the field</td>
</tr>
</tbody>
</table>
4.2 Traditional Leaders Participation

Traditional Leaders were tasked by the directives of the program to develop community beneficiary lists that were to be followed and monitored by their delegates in the fields. The Traditional Leaders’ plots were supposed to be the first on the lists. Traditional leaders also facilitated and monitored contribution of funds by farmers towards assisting the program with fuel purchase and transportation where the program had deficiencies. They were instrumental in community mobilisation for dissemination of extension information. Table 2 displays the comparative analysis of participation of traditional leaders in the two cases.

Table 2: Comparative analysis of the two cases: Traditional Leaders Participation

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SCHONOORD</th>
<th>MORIPANE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role</td>
<td>Mobilise farmers</td>
<td>Motivate farmers</td>
</tr>
<tr>
<td></td>
<td>Disseminate information</td>
<td>Disseminate information</td>
</tr>
<tr>
<td></td>
<td>Draw beneficiary lists</td>
<td>Draw beneficiary lists</td>
</tr>
<tr>
<td></td>
<td>1 out of 4 traditional leaders facilitated collection of money for fuel purchase</td>
<td>1 out of 1 Traditional leader monitored money for fuel transportation</td>
</tr>
<tr>
<td>Contribution</td>
<td>Tribal leadership support</td>
<td>Tribal leadership support</td>
</tr>
<tr>
<td></td>
<td>Tribal councils’ infrastructure for meetings</td>
<td>Accommodation &amp; security for tractor &amp; operators</td>
</tr>
<tr>
<td>Role of extension workers</td>
<td>Delivery of messages to and fro LDA</td>
<td>Delivery of messages to and fro LDA</td>
</tr>
<tr>
<td>Impediments</td>
<td>Tractors’ breakdowns</td>
<td>Tractor breakdowns</td>
</tr>
<tr>
<td></td>
<td>Insufficient &amp; late input supply</td>
<td>Insufficient &amp; late input supply</td>
</tr>
<tr>
<td>Successes</td>
<td>Yield</td>
<td>Yield</td>
</tr>
<tr>
<td>Advice for future operations</td>
<td>Address livestock damage on crops</td>
<td>Increase fleet size</td>
</tr>
<tr>
<td>Any other burning issue</td>
<td>Illegal squatters on arable land</td>
<td></td>
</tr>
</tbody>
</table>

4.3 Tractor Operators Participation

Tractor operators were hired through Expanded Public Works Program (EPWP) and trained a short while prior the launch of the program. No mechanical equipment or service for minor in-field repairs was supplied to tractor operators for any unexpected breakdowns. One of the operators used his own private tools to fix some minor repairs on the implements of all the tractors. All these limitations compromised their productivity. Table 3 depicts the comparative analysis of tractor operators’ participation in the two cases.
Table 3: Comparative analysis of the two cases: Tractor Operators Participation

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SCHOONOORD</th>
<th>MORIPANE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role</td>
<td>Plough and plant for farmers</td>
<td>Plough and plant for farmers</td>
</tr>
<tr>
<td>Contribution</td>
<td>Fix implements</td>
<td>Fix implements</td>
</tr>
<tr>
<td></td>
<td>Tools by 1/8</td>
<td></td>
</tr>
<tr>
<td>Impediments</td>
<td>Tractor breakdowns</td>
<td>Tractor breakdowns</td>
</tr>
<tr>
<td></td>
<td>Lack of mechanical support</td>
<td>Lack of mechanical support</td>
</tr>
<tr>
<td></td>
<td>Lack of minor spares supply</td>
<td>Lack of minor spares supply</td>
</tr>
<tr>
<td></td>
<td>Lack of tools</td>
<td>Lack of tools</td>
</tr>
<tr>
<td></td>
<td>Lack of night security</td>
<td>Lack of night security</td>
</tr>
<tr>
<td></td>
<td>Operators started ploughing at 08h30-9h00 because store officer reported to work at 07h30 for fuel refill</td>
<td>Operators started ploughing at 6h00 because fuel was readily available in community’s storage facility</td>
</tr>
<tr>
<td>Success</td>
<td>85.2% service</td>
<td>100% service</td>
</tr>
<tr>
<td>Advice for future operations</td>
<td>Prioritise mechanical support</td>
<td>Prioritise mechanical support</td>
</tr>
<tr>
<td>Any other burning issue</td>
<td>Unprotected conditions in remote areas</td>
<td>Unprotected conditions in remote areas</td>
</tr>
</tbody>
</table>

4.4 Document Review

The study conducted a document review on program documents such as Operational Framework Version 2012/1, Tariffs for mechanisation, Monthly reporting template Annexure 2, and Overview Report. The documents reflected the level of readiness of extension service at the time of implementation, tariffs for government mechanisation service, as well as the operational and production statistics. The service was rendered to farmers free of charge contrary to the spirit of the Limpopo Government Department of Agriculture (2011) that “Ploughing and other mechanised products are offered to farmers on fee basis. ...The objective of the department is to develop farmers to become independent”. The study found that at the time of the launch the program had not yet been provided with the required human resource support. For example, by the 9th November 2012 when the operational framework was approved and issued, prior the launch on the 13th November, additional operators required for the program had not yet been procured. By the 9th November 2012 the operational framework read: “Departmental tractor drivers/operators have been identified and their services will be utilised. Appointment of additional tractor operators to complement the internal capacity will be done in consultation” (Limpopo Government Department of Agriculture, 2012).

For the kick start of the program in Makhuduthamaga, additional seven tractors were borrowed from other adjacent sub-districts. Ten tractors were allocated to Schoonoord sorghum production belt and one tractor to Moripane maize production area for ploughing and planting. Each tractor was operated by two operators. The productivity of services in the respective areas varied (Limpopo Government Department of Agriculture, 2013). Table 4 depicts the document review findings from both cases.
Table 4: Comparative analysis of the two cases: Document review

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SCHOONOORD</th>
<th>MORIPANE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of farmers involved</td>
<td>350</td>
<td>43</td>
</tr>
<tr>
<td>Number of tractors provided</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Number of operators</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>Tractor : Farmer ratio</td>
<td>1:35</td>
<td>1:43</td>
</tr>
<tr>
<td>Fuel supplier</td>
<td>LDA</td>
<td>LDA</td>
</tr>
<tr>
<td>Hectares ploughed</td>
<td>384</td>
<td>81</td>
</tr>
<tr>
<td>Hectares planted</td>
<td>327</td>
<td>81</td>
</tr>
<tr>
<td>Deficit (hectares not planted)</td>
<td>57</td>
<td>None</td>
</tr>
<tr>
<td>Reason for deficit</td>
<td>Broken implements</td>
<td></td>
</tr>
</tbody>
</table>

5. CONCLUSIONS

The extension service implemented Limpopo farmer mechanisation support program without having conducted survey and need analysis to determine areas of need, relevant role players, and beneficiaries, as well as to determine the appropriate approaches per each area of operations as recommended by the principles of extension’s *Nine Spokes of the Wheel* and PDA. The program was also implemented without a readiness assessment as recommended by Kusek and Rist (2004). The extension service did not assess its readiness as well as the readiness of the prospective beneficiaries thereof. As a result, the program was then implemented without the necessary mechanical, administrative and human resource support, and timely input supplies.

The program was also implemented without properly defined extension route map, and monitoring and evaluation system. Farmers were not engaged in the planning of the implementation and operational phases of the program. They therefore eventually played a passive beneficiary role than participatory. The local administrative support system was not made to adjust their routine processes to accommodate extension service’s seasonal responsibilities. The extension service therefore suffered the impact of such discrepancies. When Traditional Leaders are tasked to draw beneficiary lists, names of their close relatives top the lists. As a result almost only the clan benefit first while the season still lasts.

The extension service applied two different approaches in two separate adjacent areas of production. One approach was applied in the Schoonoord sorghum belt and the other in Moripane maize production area. Management of the ploughing and planting processes in the sorghum production area were led and managed hands-on by extension workers while in the maize area the processes were led and managed hands-on by farmers themselves. The two different approaches produced different outcomes between the two cases. Table 5 depicts the variants between the cases.
Table 5: Comparative analysis of the two cases: Developmental Outcomes

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SCHOONoord</th>
<th>MORIPANE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>Extension workers led the</td>
<td>Farmers led the processes</td>
</tr>
<tr>
<td></td>
<td>processes</td>
<td></td>
</tr>
<tr>
<td>Ownership</td>
<td>Extension workers owned up</td>
<td>Farmers owned up</td>
</tr>
<tr>
<td>Responsibility</td>
<td>More responsibility on extension</td>
<td>More responsibility on farmers</td>
</tr>
<tr>
<td></td>
<td>workers</td>
<td></td>
</tr>
<tr>
<td>Dependency</td>
<td>More dependency on extension</td>
<td>Less dependency on extension</td>
</tr>
<tr>
<td></td>
<td>workers (No extension worker, no work)</td>
<td>workers (No extension worker, no difference)</td>
</tr>
<tr>
<td>Self reliance</td>
<td>Less self reliance in farmers</td>
<td>More self reliance in farmers</td>
</tr>
</tbody>
</table>

6. EXTENSION IMPLICATIONS

1. When agricultural development program is implemented without proper extension approach or extension route map, participation of farmers becomes fragmented and disintegrated. As a result, extension workers work hard rather than smart.
2. Exclusion of farmers’ participation in the planning process of a program meant for their advancement renders them passive participants and less committed beneficiaries thereof. As a result, extension workers carry much of the responsibilities.
3. When the existing internal administration support service is not properly integrated with the seasonal extension processes, extension service fails to deliver services within targeted and suitable timeframes.
4. In the absence of a clear program plan with human development outcomes, and monitoring and evaluation framework, extension service becomes developmentally fruitless.
5. When farmers actively participate in the day to day operations of the program, they own and take lead of the processes. As they own, they take responsibility of eventualities towards sustaining the program (Diale, 2013).
6. Farmers’ less dependency on extension workers may suggest that extension workers achieve their “empower and let go” (Diale, 2011) development objective.
7. When extension service works towards developing farmers into independent self-reliant participants, and top-down directives dictate the contrary, extension service becomes frustrated. As a result, the quality of agricultural service delivery gets compromised.

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IMPACT OF THE RAM EXCHANGE PROGRAM ON WOOL PRODUCTION IN MQANDULI.

Nongingi, M.46

THIS PRESENTATION IN MS POWERPOINT FORMAT IS INCLUDED IN A SEPARATE FOLDER ON THE CD. THE FOLDER'S NAME IS: CONFERENCE 2014 - POWERPOINT PRESENTATIONS.

46 Department of Rural Development and Agrarian Reform, Eastern Cape. nz4sho@yahoo.com
INTEGRATION OF MULTIDISCIPLINARY EXTENSION SERVICES TOWARDS SUSTAINABLE RURAL DEVELOPMENT IN THE WESTERN CAPE: A CASE STUDY OF THE COMPREHENSIVE RURAL DEVELOPMENT PROGRAMME (CRDP) IN DYSELSDORP.

Xaba, A. C. & Marais, F. J.

ABSTRACT

The Comprehensive Rural Development Programme and the vision for 2030 captured by the National Development Plan, calls for participatory processes for sustainable and inclusive rural economic development. Agricultural Extensionists play a critical role in shaping the appropriate response to a myriad of grassroots, commodity and regional challenges spanning far beyond farm fences. In order to bridge the vast spectrum of expertise required and limited capacity to serve rural communities, a professional communicative interventionist approach is required. Integration across sectors and technical disciplines should result in a more holistic understanding of the solutions that could be offered to rural communities. This is however only possible with a dedicated community participatory approach to address the true needs to improve the quality of life and economic wellbeing of clients. Extensionists will require the necessary skills and understanding of social dynamics to work in such an environment. Mechanisms to support recruitment, contracting, training and development and performance management of extensionists will have to be geared towards this fundamental acknowledgement of the expanse of competency required to facilitate social change processes in the rural landscape.

Correspondence Author: A.C. Xaba

Key words: Professional communicative interventionists; Integration of extension services, agricultural enterprise development, cross-sectoral multidisciplinary extension approach, community participatory approach, National Development Plan (NDP); Comprehensive Rural Development Programme (CRDP).

Hypothesis: Integrated extension services across sectoral disciplines will promote sustainable rural development.

1. INTRODUCTION

While agricultural enterprise development and support is the key focus for agricultural extensionists, their involvement cannot be limited to agricultural related issues. Agricultural development does not happen in isolation and most agricultural interventions will have an influence, or be influenced, by aspects and sectors broader than just agriculture. Agricultural extensionists might feel drawn in by broader issues related to rural development in the quest to improve the quality of life and economic well-being of clients. Agricultural extensionists will encounter challenges outside the domain of agriculture in processes to assist agricultural development due to the interconnectedness of processes.

47 Acting Chief Director: Rural Development Co-ordination, Branch: Agricultural Development and Support Services, Department of Agriculture, Provincial Government of the Western Cape, Private Bag X1, Elsenburg, 7607. tonix@elsenburg.com.

48 Senior Lecturer & Faculty Manager: Extension, Elsenburg Agricultural Training Institute, Branch: Agricultural Development and Support Services, Department of Agriculture, Department of Agriculture, Provincial Government of the Western Cape, Private Bag X1, Elsenburg, 7607. francoism@elsenburg.com.
for development. It is generally agreed that the rural context presents a complex web of interconnected challenges which cannot be addressed by sectors in isolation.

South Africa boasts some of the most progressive legislation in terms of rural development. The Comprehensive Rural Development Programme (CRDP), which was announced in 2009, aims to create vibrant, equitable and sustainable rural communities with food security for all. The underlying philosophy is that South African citizens should take control of their own destiny through participatory processes. With the CRDP, emphasis is placed on a community participatory approach, with a distinct move away from an interventionist approach to development. Regional and functional coordination of the different actors involved (including government, non-governmental organisations, communities, etc.) are regarded as crucial elements for the successful implementation of the CRDP.

The Department of Agriculture: Western Cape (DoA) is mandated with rural development coordination in this province. From an extension perspective this coordination role seated within the DoA can be seen as a privileged position in order to facilitate and coordinate rural development initiatives. This is especially true when extensionists move away from the idea that their role is primarily to transfer technology to beneficiaries in terms of agricultural related assistance. Ideally, extensionists should accept their position as professional communicative interventionists. Extensionists, as agents of change that accept this responsibility, will be involved to develop and/or induce novel patterns of coordination and adjustment between people, technical devices and natural phenomena. It is well known that different role players may define problems differently. Role players may, from their own perspective and with limited exposure to the full context of the problem and without coordinated facilitation, all see possible solutions differently. Communication interventionists, especially those with a sound technological background, may prove to better facilitate and assist in resolving problematic situations across sectoral disciplines.

In this paper a case study approach is adopted to evaluate the roles fulfilled, the structures utilised, as well as the challenges and opportunities faced by extension agents.

2. PURPOSE OF THE PAPER

This paper aims to create an awareness of the lessons learned through the CRDP implementation process in terms of the challenges and opportunities that exist for extensionists. The impact and challenges that a traditional interventionist approach to service delivery has, compared to the proactive inclusivity of multisectoral actors, will be explored. This paper will attempt to indicate avenues that could be explored through cross sectoral and multidisciplinary integration in the rural development context. A participatory approach to integration of efforts could contribute to breathing life into the National Development Plan (NDP) towards sustainable rural development in South Africa. This approach will also highlight the DoA’s experience in the commodity approach to extension which draws in private sector support, demonstrating collaboration for development.

3. THE COMPREHENSIVE RURAL DEVELOPMENT PROGRAMME (CRDP): A NEW APPROACH TO DEVELOPMENT

The CRDP was approved by the South African Cabinet in August 2009, and shortly thereafter launched at the pilot site in Limpopo by President Jacob Zuma (RSA, SAGI 2009a; RSA, SAGI 2009b). Dysselsdorp was chosen as the pilot site in the Western Cape (DOA: PGWC 2010). The CRDP is informed by various other policies and legislation focused on improved service delivery in education, health, housing. These include, amongst others, the Constitution, the National Rural
Development Framework, the Reconstruction and Development Programme, the Growth, Employment and Redistribution Strategy, Ilima/Letsema, Rural Transport Programme as well as the Land Reform programme (RSA, SAGI 2009a).

The CRDP emphasises that the diverse needs of the communities would only be met if the participation of various departments across the different spheres of government, non-governmental organizations, research institutions and communities are ensured (DRDLR 2009:4). The major difference between the CRDP and past government strategies in rural areas is the fact that it is premised on a “proactive participatory community-based planning approach” rather than an “interventionist approach” to rural development (ibid.:3).

The proactive participatory community-based planning approach involves socio-economic profiling, community participatory processes and intergovernmental co-operation (ibid.:3). Social mapping is also done to develop a good understanding of the nature of poverty and existing organizational, informational, and social networks (ibid.:11). According to this participatory approach the whole of society should have the opportunity to provide inputs through community structures within the specific community (RSA, SAGI 2009b). The CRDP suggests that all state departments, municipalities, state owned enterprises, non-governmental organisations (NGOs), donors and financial institutions be involved in the process (DRDLR 2009:31). Previous government initiatives, at least those implemented since democracy, did not emphasise stakeholder participation with the same boldness as the CRDP (ibid.:3).

The CRDP provides room for each province to operationalise implementation of the CRDP differently according to the overall planning frameworks within the province. The DoA and their extension personnel are, alongside other sectoral stakeholders, regarded as critical agents to champion the principles of cooperative governance through provision of technical and social facilitation.

The National Outcomes approach adopted in 2009 in the Medium Term Strategic Framework calls for integration across the three spheres of government and across the various Departments and their respective mandates (RSA, SAGI 2009c). Inherently this implies a fundamental shift in government interaction. This integration, in practice requires that each government stakeholder holds the social skills and capacity to collaborate in the broader development context.

The pillars of the South African NDP include amongst others the mobilisation of citizens, active engagement of citizens in their own development and the fostering of strong leadership throughout society. The pillars of the NDP provide a framework for rural development actors, including extensionists, to address the challenges they face (NPC 2011:2). In addressing the gaps in integration of efforts, the participation by various actors could contribute to bringing impetus to the NDP towards sustainable rural development in South Africa.

Financial and human resource allocation by the public sector requires alignment. Regional and functional coordination in terms of planning and implementation will be key in achieving this integration. The implementation of the CRDP in this pilot site, Dysselsdorp, has made an attempt to create institutional structure to promote this integration and coordination. The CRDP implementation in Dysselsdorp provides a useful case study to examine the challenges faced.
4. RESEARCH METHODOLOGY

The CRDP with its new developmental approach might bring changes, challenges and opportunities to extension and advisory delivery. In order to understand these, a qualitative analysis was found suitable. The intrinsic case study design was found most appropriate to answer the questions. Through this case study design the endeavour is to understand the case in depth, in its natural setting and recognizing its complexity and its context (Punch 2005:144). Case studies cater for multiple sources of data collection methods. In this case study of Dysselsdorp where the challenges and opportunities for agricultural extension were investigated, ethnographic interviews were used, thus interviews that were unstructured, non-standardized, open-ended, informal and in-depth. Some of these were group interviews, while others were interviews with individuals.

Observation of behaviour as a stream of actions and events that unfold were recorded on paper. Observation was unstructured, thus no predetermined categories and classifications were used. Behaviour was thus observed as it unfolded naturally. Field notes were recorded with the consent of the interviewees. This ethnographic analysis did reveal social practices which were “shared, contested, negotiated, and sometimes rejected by other actors involved” (Long 2002:2). It would have been inadequate to just identify structural outcomes. An ethnographic study through the lens of an actor-oriented approach enabled the deconstruction of the processes of the intervention (ibid.:4), and to come to terms with agency displayed by different actors.

In addition, documentary sources provided rich data. Key data sources were studies done by the DRDLR and Impact Economix (DRDLR 2013:14) and the Council for Scientific and Industrial Research (CSIR 2005:47) which provided a baseline to compare the current status to. The data was used in triangulation where the findings of the one could be checked against the other. This enhanced the validity of the data and the study. Insight gained may be further investigated through quantitative analysis in future research.

5. EXTENSION PRACTICES OBSERVED WHEN OPERATIONALISING THE CRDP

Technical advice by agricultural advisory services of the DoA has contributed to the “culture of home vegetable gardens” in Dysselsdorp, albeit the observation of a departmental agricultural advisor in the area. Currently the contribution of these gardens to economic development may be regarded as minimal, but these gardens do assist many a household in the area to be more food secure. Observation and discussions with clients of the DoA convinced the researchers that clients are in general satisfied and impressed by agricultural related production advice. The challenge extension officers encounter is taking advice a step further through marketing and value addition beyond primary produce.

From discussions with extension personnel it is clear that it is envisioned that more than just food security is the preferred outcome of advice to their clients. The ideal, according to the CRDP objectives and agricultural advisors, will be that the home gardens contribute to broader agricultural and economic development opportunities in the area. The same could be said by residents who own Boer goats, roaming the town. Attempts have been made to establish a cooperative dairy enterprise for goat milk and the processing thereof into various products. Similarly, suggestions have been made to pool the produce of household gardens for collective marketing and processing. Both these innovative recommendations have been met by more resistance than thought and not much has developed from these recommendations. Other issues than just the mere technical are involved in these processes and extension officials lament about the social intricacies when attempting to facilitate discussions around these suggestions.
Extension officials also have other challenges than just transferring the best technology for the environment and the facilitation of societal challenges. Extension personnel are few in numbers and their work is largely in response to ad hoc requests. Proactive extension cannot really take place due to the high demand for technology transfer compared to a programmed approach to service delivery. Extension officers interviewed expressed that although the intension was there, their work day is hardly ever executed as planned, output is not accurately measured and the alignment between output and targets are not always clear: “We are in crisis management mode”. Extension officers agree that their competency skill set should include technical, social and business skills, however current short staffing required a narrow focus on technology transfer. Extension officers interviewed are convinced that most departmental officials from various external service delivery programmes should play a greater role in extension. Other professionals that, according to extension officials, should assist to provide a comprehensive advisory service to CRDP clients were as follows: Landcare officers, Veterinarians, Researchers, Economists and Educators.

Extension officials also expressed their concern that very little research is focussed on production and societal processes at work amongst so-called non-commercial producers. In the main the DoA extension officers in the Farmer Support and Development Programme focus on smallholder and subsistence farmers and thus deliver a service to fewer commercial farmers. This is not aligned to the focus of other DoA Programmes which allegedly focus their efforts on service delivery to commercial farmers.

In 2008 the National Department of Agriculture released Agricultural Extension Norms and Standards which required that agricultural extension officers have specific tertiary levels of qualifications in order to operate as technical advisor/extension officers (DAFF 2005:7). This resulted in community development officers who were previously geared to tending to the social and other broader aspects of DoA clients’ needs, have since been up skilled to become more technically focussed. The output of the extension officers is therefore focussed on agricultural enterprise development rather than broader development initiatives. According to those interviewed, astonishingly approximately 60% of the demand for extension services is focused on addressing social intricacies and the wellbeing of clients.

Agricultural extension and advisory services delivered by the DoA has been largely focussed on Comprehensive Agricultural Support Programme grant allocation and management for farm support and development. The Commodity Approach was adopted by the DoA, in 2009, which did impact on the role of extension officers in the DoA. Since then, close collaboration with commodity structures was taken up, limiting extensionists’ demands in terms of grant allocation and associated procurement processes. Greater emphasis was placed onto comprehensive technical evaluation of agricultural enterprise plans and further enhancement of business planning. This has contributed to a more focussed approach to providing a broad spectrum of technical inputs resulting in objective development and approval of business plans with greater potential for financial sustainability. Increased capacity offered by commodity structures through extension, advisory and mentorship support has in turn complimented farmer support and development.

A Council of Stakeholders (CoS) has been established in the community of Dysseldorp as a community representative forum. Government and the private sector, through the Intergovernmental Steering Committee and specific workgroups, can engage and communicate with the community via the CoS to ensure escalating grassroots needs into broader development plans. This has been the basis for taking the community participatory approach forward. To assist the CoS, the Oudtshoorn Municipality initially employed a communication officer, also referred to as an intern, to support the
CoS in ensuring good communication with the community at large. This implies that communication was identified as a key factor to the success of the CRDP. Due to differences between the community worker, the Oudtshoorn Municipality and the CoS, the community worker was released and never replaced. Since then communication with the broader community on all CRDP initiatives has waned. It was noted by the CoS members who were interviewed, that through workgroup activities, certain sectors of the community are engaged on an ongoing basis. Due to communication and facilitation challenges, extension officers may be tempted to bypass participatory processes. Such may override the COS resulting in community needs not truly being met.

Extension personnel find the facilitation of community participatory processes challenging and as “adding a new dimension to normal activities”. They realise that their skills needed to facilitate and coordinate interactive processes, and to negotiate cooperative agreements across sectoral stakeholders, need improvement. Networks that could have been beneficial to establish trust with the community are not operating optimally. Extension personnel regard their pre-occupation with infrastructure establishment on land redistribution projects with lessee farmers lack farming experience, as one of the contributing reasons why facilitation and negotiation skills, as well as established networks, are lacking.

Through the implementation of the CRDP in Dysselsdorp, it is evident that co-ordination of rural development stakeholders and initiatives is essential, due to the wide range of development initiatives that have been undertaken.

If there was greater integration between spheres of government (national, provincial and local) a project within Dysselsdorp, like the establishment of sandbag houses might have been regarded as a success. This housing project was initially viewed as a “quick–win initiative” implemented by the Department of Rural Development and Land Reform. It was envisaged that the Municipality would maintain the infrastructure established. Officials of the Oudtshoorn Municipality indicated that they were not fully involved in technical planning, nor well informed generally of Departmental driven projects. This account demonstrates the need for professional communicative interventionists (Leeuwis 2003) to facilitate multi stakeholder processes to arrive at agreed compromises.

6. CONCLUSIONS AND EXTENSION IMPLICATIONS

Extension personnel seem to encounter challenges in transitioning from providing agricultural enterprise development in a strict project management cycle to provision of a service where participation and facilitation is paramount. It appears that this facet of extension delivery was lost during an era where infrastructure and implement installation and procurement, in the process of disbursement of the Comprehensive Agricultural Support Programme (CASP) grant funding, was regarded as priority. This has resulted in very much of a traditional interventionist approach to extension.

Marketing and processing mechanisms most probably will promote the conversion towards economic development. Co-operative arrangements and other value addition options are currently being explored more formally through the development of an Agricultural Development Plan for Dysselsdorp, thus initiating a broader approach to agricultural development in Dysselsdorp. This approach will require that a multidisciplinary project team is established to ensure that even facets outside of the technical realm of agriculture is indeed catered for, such as food security and the wellbeing of clients.
However, it must be shared that the DoA in the Western Cape has taken an innovative step to involving the private sector to improve support to the disbursal of the CASP funds and technical support offered to farms through the Commodity Approach since 2009. This approach has resulted in the most established commodities in the Province being fully involved in the evaluation of enterprise plans for CASP funding allocation, provision of production technical support and mainstreaming new farmers into the value chain. This demonstrates the DoA’s commitment to exploring interactive processes beyond statutory entities to arrive at agreed innovative compromises.

An integrated approach to extension even extends beyond the DoA, to other departments in order to begin to tackle the complex web of challenges faced in rural areas. It is however in this alignment and integration with other statutory programmes that the synergies will begin to bear fruit.

The CRDP implementation in Dysselsdorp has amplified the DoA’s understanding of the complex web of challenges faced in developing rural communities and the success seems to hinge on active engagement between officials from different departments that attempt to understand the societal and personal reasons behind preferences and choices of people when constructing a livelihood. Extension personnel are constantly confronted with a dynamic flow of changing policy, technically sound approaches but also the real needs and perceptions of the clients. Through integration of extension services, officials gain insight into what the cross-sectoral offerings are, in order to harness the benefits of symbiotic arrangements and agreements to optimise benefit to the client. Understanding the various sectoral programmes will begin to unlock the maze of red tape and processes that stunt development initiatives. Collaborative approaches to common development priorities stimulate such exchange, troubleshooting and joint ‘project management team’ structures can provide catalytic opportunity to expedite tedious processes, otherwise delaying progress. Extensionists’ participation in such fora could provide the impetus needed to experience a more holistic, participatory approach to sustainable rural development opposed to a limited agricultural enterprise development approach.

The fact that the communities and the CoS are informed regarding officials held accountable, should ensure that beneficiaries’ needs are accommodated as far as what is technically possible, if the community participatory approach is adopted. It would certainly make sense that officials delegated with the task of serving on such CRDP structures should be appropriately delegated and this should be captured in performance agreements and performance management processes to ensure that progress and output is monitored. The type of development envisioned by the NDP should be steered and driven by the ‘client’ but navigated by extensionists who provide guidance leading up to a predetermined exit point. As empowerment of clients is of paramount importance to sustainable rural development, extension officials require the necessary understanding and social intelligence to develop such capacity and community ownership of initiatives.

Key to ensuring that extensionists are adequately qualified to deal with this community participatory approach, over and above the technical aspects of their field of expertise, tertiary training institutions should consider inclusion of extension services as a core component of the syllabus. Failing this, it is recommended that Departments of Agriculture provide opportunities for mentorship and coaching of young professional extensionists to ensure that the communicative skills are transferred and developed. In addition, it would be beneficial to consider including such skills competency in recruitment criteria when selecting potential extension incumbents.
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BEE-FARMING FOR RURAL UPLIFTMENT - IKAMVALETHU BEEKEEPING PROJECT.

Mpetsheni, S. W. 49

1. INTRODUCTION

The role of the Department of Rural Development and Agrarian Reform (DRDAR) in the Eastern Cape (EC) is to eradicate poverty, increase food security, stimulate rural economies, support and ensure sustainable rural livelihood.

Since our country as well as the Eastern Cape Province is faced with high unemployment and high poverty rate, there is a growing demand for social security services and access to basic service delivery needs.

Despite this economic and fiscal environmental outlook, the Department of Rural Development and Agrarian Reform has identified agriculture as a critical sector to create jobs in the short and medium term.

The Department of Rural Development and Agrarian Reform has different skills development programs. Its aim is to help young people who want to start businesses in the farming sector.

2. AIMS & OBJECTIVES

To promote livelihood of people of Mhlontlo at large as well as promoting autonomy and independence

3. STUDY SITE DESCRIPTION

The Ikamvalethu Beekeeping Project is a community project that was established late in the year 2001 by disadvantaged communities (women and youth) of Kambi 20 Tribal Authority (Upper Mjika and Lower Mjika) in Tsolo district. The slope is slightly 4-10%, in an oblique structure with fertile sandy-loam soil. Average annual rainfall ranges from 600-700mm. GPS Co-ordinates is 31° 29’ 43” S; 28° 76’ 51 E.

4. PROJECT IMPLEMENTATION

As an extension officer I have conducted social mobilization in a form farmers’ & information days to create awareness and exchange information on agricultural practices and seek development that are sustainable for rural youth and encourage community participation towards beekeeping project to be implemented eradicate poverty and unemployment.

Stakeholders meetings were also conducted such as ARC, Social Dev, DAFF and DRDAR. ARC assisted with training beekeeping farmers. DRDAR assisted with demonstrated trainings and informative gatherings. Social Development assisted with funding.

5. CURRENT STATUS

49 Department of Rural Development and Agrarian Reform, Eastern Cape. Email: mkafulapeterson@yahoo.com
Ikamvalethu beekeeping project is a registered co-operative with 7 beneficiaries- 4 females and 3 males. The project consists of 3 sites (1- Khambi forest, 2- H/Stead gardens & 3- Mhlahlane forest) and is using blue gum trees.

6. OPPORTUNITIES

They were invited by the National Minister of DAFF- Tina Joematt-Peterson- recognition, exposure and training. Ikamvalethu project assists farmers from Alfred Nzo Region for pollination, as well as Chris Hani Region for bee removal. DRDAR organises demonstrations, mentorship, trainings and informative gatherings.

7. RESULTS AND DISCUSSIONS

Won Top Entrepreneur Award in processing at O.R. Tambo Region, Provincial level and then proceeded to National level. 208 active bee hives and they are still awaiting 50. They have harvested 2 tons and 90 kg’s of honey during the winter season. They were also awarded a manual honey extractor machine, protective clothing, and step ladder. The project was awarded a piece of land for an erection of an apiary and fencing is still pending.

8. Main Challenges

The project does not have a formal market. It is also subject to vandalism by neighbouring villages, resulting to produce being stolen. Global Warming is also a challenge as the swarm might migrate leaving empty hives. Birds tend to consume and destroy the produce. Danger from colonies can be a threat to livestock and people.

9. RECOMMENDED SOLUTIONS

Coordination with other stakeholders with the aim of finding a formal market, developing a proper construction of bee hives and with a well fenced site away from houses and kraals.

10. CONCLUSION

The project manages to contribute towards food security and socio-economic development. It further contributes to protected and enhanced environmental assets and natural resources. The project is able to advise other farmers.
CAN GENETIC IMPROVEMENT OF LIVESTOCK IN RESOURCE POOR ENVIRONMENTS PLAY A WIDER DEVELOPMENT ROLE?

Olivier, J. J. & Cloete, S. W. P.

ABSTRACT

This review set out to compare the resource poor and commercial sectors in South Africa for ruminant livestock production systems. It was assumed that resource poor ruminant production would benefit from a stable production environment, resulting in a lowering of the risk associated with production. The importance of a trait complex involving adaptability, robustness and fitness was thus assumed to be of paramount interest to such livestock keepers. The prospects of achieving genetic gains in this trait complex were considered next, along with recommendations for the implementation of selection for such traits in the genetic resource belonging to resource poor farmers. Finally, the application of modern technology like molecular genetics techniques and assisted reproduction techniques in this sector receives some attention. It was concluded that formal livestock recording and improvement in resource poor ruminant livestock farmers would be feasible provided that a number of prerequisites are met.

1. BACKGROUND

The past decades have been marked by rapid change in technological progress, urbanization, instability on monetary markets and the “global village”. There is still rampant poverty in part of Sub-Saharan Africa, despite scientific breakthroughs and rapid progress in global communication systems. The developed world is consistently acquiring and applying this knowledge but developing countries are not progressing as well. In the Millennium Development Goals Report (2005), Kofi Annan (the then secretary general of the United Nations) stated: “We will not enjoy development without security, we will not enjoy security without development, and we will not allow either without respect for human rights. Unless all these causes are advanced, none will succeed”.

It has to be observed that the fundamental human rights of millions of people in the developing world are closely interwoven with livestock and the meat, milk or fibre they produce (Pilling et al., 2007; McDermott et al., 2010). The ruminant livestock industry is closely interlinked with the eradication of extreme poverty and hunger (Goal 1) and ensuring environmental sustainability (Goal 7; Millennium Development Goals Report, 2005). Improved and sustainable levels of animal production would also benefit household food security and increase household income in the developing world. Achieving this would also indirectly benefit other millennium development goals, such as the achievement of universal primary education (Goal 2), the reduction of infant mortality (Goal 4), and an improved maternal health (Goal 5). Vulnerable population groups are set to benefit from the inclusion of meat in their diets (Faber, 2010; McAfee et al., 2010). According to Seré and Steinfeld (1996) medium- to low-input production systems provide all (or at least the major share) of the livelihood of the livestock-keeping households, many of whom have few resources beyond their smallholdings and their livestock. For many resource-poor farmers it may be difficult to access markets to buy inputs and services or to sell their livestock products.

50 Directorate: Animal Sciences, Elsenburg, Private Bag X1, Elsenburg, 7607, Email: bukso@elsenburg.com
51 Directorate: Animal Sciences, Elsenburg, Private Bag X1, Elsenburg, 7607, Department of Animal Sciences, University of Stellenbosch, Private bag X1, Matieland 7602 Email: schalkc@elsenburg.com
Ruminant livestock production is often associated with pastoral or livestock-cropping endeavours in arid and semi-arid areas. Yet, despite an obvious need for development in small-scale ruminant livestock production systems, support for the resource-poor sector is often lacking. The bulk of countries in Southern Africa have no or limited capacity for the support in terms of physical infrastructure, intellectual infrastructure and policy development for managing farm animal genetic resources for food production (Brockhaus, 2007). Structured programmes for the breeding of ruminant livestock (including cattle, sheep and goats) are thus largely absent (Thieme, 2007), while basic prerequisites for livestock recording (the presence of a distinct breeding goal, individual identification and performance recording) are mostly not available. Knowledge of breeding tools like accelerated reproduction techniques and genetic evaluation of livestock also may limit progress.

South Africa provides an interesting situation with a well-developed commercial livestock production sector that exists alongside low-input systems with communal land-use (Cloete, 2012). A lack of producer support by the state (as in Australia and New Zealand) compared to countries belonging to the Organization for Economic Co-operation and Development (OECD-FAO, 2008), results in the South African commercial livestock industry being efficient and in many ways comparable to livestock industries in the developed world. The South African commercial animal agriculture sector is compared to their small-scale/communal counterparts as a point of departure in this review. The role of genetic improvement and strategies as to how to achieve it in the latter sector then receives some attention, before some concluding remarks.

2. COMMERCIAL AND COMMUNAL RUMINANT LIVESTOCK PRODUCTION IN SOUTH AFRICA

At first it needs to be emphasised that the bulk of agricultural land in South Africa is not arable (Cloete and Olivier, 2010). This results in vast tracts of the country being suitable only for extensive livestock production. The livestock utilising these vast pastoral resources mostly consists of small ruminants in the central and western parts. Small ruminants are increasingly replaced with bovine livestock in a northern and eastern direction.

**Beef and dairy**

Bergh (2010) reported that between 170000 and 260000 beef cattle weights were recorded annually from 1992. Service providers (the Agricultural Research Council, Breedplan® International and SA Studbook) manage these data and make outputs available to their members. According to Rust et al. (2010), breeding values are available for a range of growth/production, size and reproduction traits. This information is made available in real-time on the internet for utilization by beef producers during the selection of their stock. Communal beef cattle are generally not included in these initiatives. Although provision is made to accommodate such animals, uptake is low (Nenghovela et al., 2010). Herd sized averages 19 head for the communal/emerging sector as compared to 413 head in the commercial sector (Scholtz et al., 2008). According to the latter authors, management tools such as a controlled mating season and artificial insemination are rare among communal farmers, while it is readily implemented in the commercial sector. Nowers et al. (2013) reported that beef animals subjected to communal management had a substantially reduced reproduction and growth compared to contemporaries managed commercially. Communal cows and their progeny compared favourably with commercial animals under commercial management conditions. The observed low levels of production in communal animals result in a substantial reduction in off-take from the operation compared to commercial enterprises (Scholtz and Bester, 2010). If this limitation can be overcome, communal beef production could contribute substantially to household food security and sustainability in this sector.
The mainstream South African dairy breeds are all accredited with the Multiple Across Country Evaluations (MACE) evaluation scheme for dairy animals (Mostert et al., 2006). Dairy was listed as only 10% of why communal farmers kept cattle, and non-dairy breeds are commonly used for milk production in this sector (Grobler et al., 2008). According to the latter authors, herd size averaged 39 head for dairy cattle and 42 head for dual-purpose cattle in this sector. Details of levels of production were not provided but it is assumed to be fairly low. It thus seems like there are ample opportunities for enhancing communal/small scale beef and dairy production by structured livestock recording and breeding.

**Small ruminants**

South African small stock recording is well described in the literature (Schoeman et al., 2010) and papers involving breed analyses on the most important breeds are readily available (Muller et al., 2002; Olivier and Cloete, 2011, Zishiri et al., 2013). According to the latter references, South African commercial ovine germplasm is also commonly exported to developed countries.

Marais (2007) compared the genetic merit of commercial Merino rams with rams from the communal sector. Progeny from commercial rams were superior to those of communal rams for wool weight, clean-scoured yield and fibre diameter, resulting in substantial economic gains of about 35%. In another study, Marais (2006) indicated that reproductive output of communal ewes mated to communal rams were substantially improved relative to that of ewes mated to commercial rams. This result may possibly result from a lack of adaptation of commercial rams to the low-cost environment. Notwithstanding, reproduction of both groups were low at 27 and 37 lambs weaned per 100 ewes mated respectively. Ewes on properties of emerging farmers produced an average of 34 lambs marketed per 100 ewes mated, with ranges from 10-57 (Grobler, 2008). These levels of performance are substantially reduced relative to those in commercial flocks (Fourie and Cloete, 1993). The potential for substantial improvements in the performance of animals in this sector is thus available.

3. **THE POTENTIAL ROLE OF GENETIC IMPROVEMENT**

This contribution envisages that genetic improvement programmes aimed at local ruminant genetic resources in resource-poor production systems can be the “vehicle” to improved livestock production in this sector. The point of departure for this discussion is that it is contended that an important “improvement” objective of livestock development in resource poor communities will be to ensure stability of production and thereby to reduce risk. Improvement is not based on animal improvement as such, but rather a holistic “improvement” of the production environment including animal performance. Reproduction and survival in low input environments is of paramount importance for production.

The integration of genetic improvement programmes with other livestock improvement activities (such as the management of the environment and animal health, product preparation for market, easy recording methods and practical training) is essential in smallholder production systems. To be viable, integrated breeding programmes must generate monetary user benefits, while linking the benefits to obligations and balancing the returns from production to the costs of the services provided. A recording and genetic evaluation scheme named Ovigol® was launched to provide progressive Brazilian sheep breeders with the option of selection for traits linked to the profitability of their operations (Amer et al., 2010). Uptake during the first 18 months of existence were good, with records of 5195 performance recorded animals of 13 breeders having been entered into the system. Similar interventions could be implemented for resource poor farmers in South Africa. It is envisaged that the feedback loop associated with animal recording and evaluation in this sector, as designed to create functional genetic improvement programmes, may serve as the basis of a virtuous circle extending to more farmers. However, it needs to be stressed that recording schemes involving
resource poor farmers are highly unlikely to be cost-effective and need to be subsidized from funds supplied by local government, higher education institutions or other external sources (Cloete, 2012). However, it is foreseen that such systems will promote concepts strived for in the South African context like, for instance, local food security, sustainable development and rural stability. We contend that this potential contribution would increase leverage and the political will for the acquisition of funds dedicated to this cause.

The Eastern Cape communal wool production system is an excellent example of a timely intervention that had a marked influence on the livelihood of beneficiaries. The South African wool industry embarked on a programme to align communal shearing sheds with commercial standards, while also providing 20000 breeding rams of superior genetics to improve the wool clip of communal farmers (Cape Wools SA, 2010). Independent assessment indicated that 28% of communal shearing sheds yielded clip prices on par with or better than the national average during 2008-2009 compared to 9% during 2005-2006. Under nutrition of children in these communities was accordingly reduced from 43% in 2004 to 28% in 2009, while the relative contribution of meat and wool to household income were raised from 47% to 65%. Value can be added if a vibrant and sustainable animal recording scheme can be added to such initiatives.

Finally, the establishment of a suitable recording and evaluation scheme for resource poor ruminant livestock owners is not solely for genetic improvement but rather a method to identify either the top producing animals in the production environment or culling non performers in order to increase productivity of the herd/flock. Livestock breeding projects in the developing world has commonly been alleged to fail because of a lack of community involvement (Kosgey et al., 2006) because the basic needs of food security were not addressed first. The integration of co-existing research and development programs in a participatory fashion including not only the natural sciences profession but also sociologists, is highly preferable to research and development programs operating in isolation (Nesamvuni et al. 2010).

4. FUTURE DEVELOPMENTS

An intervention like a vibrant and sustainable animal recording scheme may, in turn, facilitate the incorporation of more elaborate technologies. Potential spin-offs of good phenotypic records include the introduction of molecular techniques to aid traditional animal recording and evaluation schemes. In this regard, applications like the whole-genome sequencing of individuals, DNA-based marker systems, and selection according to these markers have the potential to revolutionise animal breeding (Fan et al., 2010). This technology may simplify parentage identification and therefore identification of low/high producers. The framework for incorporating these advances in traditional livestock recording has already been described for commercial livestock in South Africa (Van Marle-Köster et al., 2013). Once systems are in place to roll out such services to the commercial industry, it will arguably be easier to extend it to the resource poor and communal sectors. This led Cloete (2012) to suggest that DNA should be sampled from adequately phenotyped communal and small-scale livestock involved in official livestock recording for future usage. The latter author also contended that adaptation and fitness traits likely to be important in the resource poor context are among the trait types most likely to benefit from genomic selection.

5. CONCLUSIONS

This paper sets out to answer the question whether the genetic improvement of animals managed by resource-poor farmers can play a wider development role. Improved livestock production in this sector, resulting in an increase in wealth, was distinctly possible. However, we foresee that any such scheme is highly unlikely to be successful without the participation of the community set to benefit. The challenge is to generate monitory value as soon as possible and to continue to do so in a
sustainable manner. Moreover, the success of such a scheme will also depend on academic expertise and an external monetary momentum to be viable. The involvement of expertise from higher education or science, engineering and technology institutions would thus be needed. The initiative would also hinge on external funding, in all probability from public funds provided either by government of by parastatal funding agencies. The existence of established infrastructure for the commercial sector would allow resource poor farmers to benefit in the long run.

6. ACKNOWLEDGEMENTS

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REFERENCES


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ABSTRACT

The ultimate aim of this project is to restore the most important river system, namely the Berg River, in the Cape Town Metro pole area, South Africa, to a healthy river system that will promote human wellbeing by reducing the vulnerability of very real flooding risks associated with climate change.

This important natural resource affects every person indirectly in the Metro pole area due to the food that is produced from this resource and the value adding from the agricultural industry. This river also supplies a major portion of the water required for domestic purposes in the Cape Metro. Some 22 500 ha of irrigation of high value crops on 600 farm units along the Berg River resulted in a gross farm gate value of R 911 million of which R 642 million was from exports (2005 figures). The agricultural activities also provided 14 100 permanent and 16 500 temporary jobs during 2005.

Presently this resource is in a degraded state and poses a major threat to human health, decline of rural economy (especially the loss of permanent jobs), negatively affect the entire value adding economy of the Western Cape and further degradation of the environment increasing the risk of losing more precious natural resources during flooding events.

This condition has resulted in flooding causing damage to the riparian zone resulting in human economic vulnerability with an escalating effect to the degradation of the resource and human capacity to maintain this system.

1. SITUATION ANALYSIS

1.1 Linkages to National and Provincial strategies.

A healthy river system would enhance the economy of the Western Cape by creating more permanent jobs, especially in Agriculture, but more importantly in new industries, such as Agri Tourism, created due to the vast improvement in the quantity and quality of water within the Berg River system. The improvement of the quality of water alone could prevent the risk of losing important export markets to the value of billions of rand to the economy. The removal of 1500 ha of alien plants would save enough water for the planting of at least as many hectares of food crops thereby building our base to food security in the Province.

The Department of Agriculture: Western Cape’s Annual Performance Plan for the 2013/14 Financial Year identified a number of strategic changes with particular emphasis on:

a) At a national level twelve National Outcomes (NOs) were identified and the achievement of some of these outcomes (particularly those focussing on economic growth, workforce development, rural development, protecting the environment and service delivery) do need particular actions to be taken by the Western Cape Department of Agriculture.

b) At the same time the Provincial Cabinet accepted twelve Provincial Strategic Objectives (PSOs) and the Provincial Department of Agriculture received the responsibility to coordinate the

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52 Sustainable Resource Management: LandCare, Western Cape Department of Agriculture, Private Bag X1, ELSENBURG, 7607. Email: Franciss@elsenburg.com
implementation of PSO 10 (Creating opportunities for growth and development in rural areas). The Department is also responsible for key elements in other PSO such as those addressing economic growth and jobs, sustainability, poverty and integrated service delivery.

This project will address many of the National Outcomes and Provincial Strategic Objectives and will be a great example of our 110% green initiative in the Western Cape.

The paragraph below illustrates how this project fits into the **National Development Plan 2030**. “Our future makes it work” This plan fits like a glove to these findings:

- It is about getting the basics right, implementing government programmes, holding people accountable for their actions and finding innovative solutions to complex challenges.
- Rising temperatures more erratic rainfall and extreme weather events will cause growing losses caused by droughts and floods
- Critical interventions required to ensure environmental sustainability and resilience to future shocks
- A commitment to public and private procurement approaches that stimulate domestic industry and job creation.
- Long-term growth and investment requires a shared vision, trust and co-operation between business, labour and government.
- Over the short term, policy needs to respond quickly and effectively to protect the natural environment and mitigate the risks of climate change.
- Creating more jobs through agricultural development especially irrigated lands

### 2. PROJECT OBJECTIVES AND OUTPUTS

#### 2.1 Objectives

- To create a value for alien plant biomass that will fuel the Green Economy with renewable energy.
- To create a rural economy and corridor along the Berg River as a start, spreading to all rivers later
- To create a place of beauty for people to enjoy and create a unique tourism opportunity
- To create a ownership of the resource by the farmers along the river which has a value to them.
- To prevent and mitigate impacts of natural hazards especially flooding.
- To prevent the spread and formation of diseases to humans and animals by water.
- To prevent the spread of invasive plants.
- To promote awareness and capacity building on disaster risk prevention and mitigation to all people directly dependent on the river resource
- To promote sustainable agriculture by caring for the natural resources.
- To instill prioritization of disaster risk reduction in addressing disaster management as required by the Disaster Management Act.
- To promote involvement of local entrepreneurs in implementation of disaster risk prevention and mitigation fund as required by the AgriBEE Charter.
- To promote sustainability and co-operation of departmental programmes.
- To facilitate job creation directly and indirectly.
- To increase food production by increasing water available for irrigation
- To supply biomass to prevent evaporation of water and increase the fertility of soil
To increase the capital value of riparian property thereby making more capital available for development of agriculture and agricultural tourism.

2.2 Outputs

- Job creation
- Economic development
- Training and skills development
- Rural development
- Leverage of maximum private funding
- Immediate effect on the health of the environment with long term rehabilitation to what the river system was 300 years ago.
- Produce mulch to prevent evaporation and build soil fertility
- Tourism opportunities

3. FINANCIAL IMPLICATIONS

This project is currently a running business that requires an R 2 million injection this year to ensure all objectives are on track as then Government would be able to direct the project into the correct area and ensure the desired outcomes.

3.1. Key contracts

Presently there are informal contracts and working relations set in place and this project will be pivotal in setting up the contract to direct the private company to the correct place and under the set conditions. It is key that the private company or more is on board contract bound to deliver against a set standard and quality of work. The farmers who are the custodians of the resource must also be bound by a contract to ensure they are willing and part of the project from the beginning.

3.2. Project inputs

The raw material is biomass from 95% eucalyptus species growing along the river banks, estimated at 750 000 tons of biomass of which the market is reasonably secure as the farmers that own the land are more than willing (in most cases) to have the problem trees removed. In South Africa there is a total of 1 million hectares of alien vegetation at an estimated 250 tons/ha gives a massive 250 million tons of biomass that we could extend the project into, even generating power for the electricity network.

3.3. Project costs

<table>
<thead>
<tr>
<th>Paragraph</th>
<th>Project activities</th>
<th>Hectarage</th>
<th>R (ZAR)/ha</th>
<th>Cost</th>
<th>Private company cost</th>
<th>Project cost</th>
<th>Government costs</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Removal</td>
<td>1 500</td>
<td>R 50 000</td>
<td>R 75 000 000</td>
<td>R 60 000 000</td>
<td>R 15 000 000</td>
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<td>2</td>
<td>Sorting</td>
<td>1 500</td>
<td>R 2 000</td>
<td>R 3 000 000</td>
<td>R 3 000 000</td>
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<tr>
<td>3</td>
<td>Rehabilitation</td>
<td>2 000</td>
<td>R 3 000</td>
<td>R 6 000 000</td>
<td>R 3 000 000</td>
<td>R 3 000 000</td>
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<tr>
<td>4</td>
<td>Follow up</td>
<td>2 000</td>
<td>R 2 000</td>
<td>R 4 000 000</td>
<td>R 2 000 000</td>
<td>R 2 000 000</td>
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<tr>
<td>5</td>
<td>Tourism</td>
<td></td>
<td>R 5 000</td>
<td>R 2 500 000</td>
<td>R 2 500 000</td>
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<tr>
<td>6</td>
<td>Awareness</td>
<td></td>
<td>R 1 000</td>
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<tr>
<td>Total cost</td>
<td></td>
<td></td>
<td>R 94 000 000</td>
<td>R 63 000 000</td>
<td>R 23 500 000</td>
<td>R 7 500 000</td>
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</tbody>
</table>
From the table above the buy-in from the three spheres and especially the private company has brought the project into a roughly a quarter of the costs and will ensure sustainable outcomes for all parties. Therefore, the project is requesting total project costs of R23.5million if the private and public funds have been secured which is a higher risk with the private company. For this financial year, a project cost of R2 Million will secure the initiation of the project, which must then be further financed in the future.

The Tourism costs will be sourced from another Department to ensure a project neutral approach is followed matching funds to outcomes.

3.4. Project outputs

The outputs from the raw material larger than 50mm includes paper, cardboard, planks, chips for energy and chips for super wood. These markets have been developed by the private company and are in the initial stages. It has been mentioned as assumption that the private company would need approximately 200 000 tons of material a year when up and running at full capacity except for the electricity contract to the network supplier. These figures are impossible to confirm at this initial stage and pose a risk, as should all the markets fail then the project would only produce chips for compost. Although from a long-term agricultural sustainability, aspect compost or mulch would be ideal it would escalate the project costs to 5 times the present cost of removal.

The mulch output placed on irrigated fields will save water and build the soils health and fertility which in itself is a good long term project that on its own could warrant this project just from a climate adaptation perspective.

3.5. Product buyers

The product buyers are at this stage the following:

- Paper: India biomass in the form of wood poles
- Cardboard: Japan biomass in chips or poles
- Planks: Internal and export market
- Chips for energy: Internal market to replace coal based energy source of which the first contract has been signed
- Chips for super wood: Not confirmed as yet.
- Compost or mulch: Farmers from the district.


Due to the returns being in the form of environmental services it would hard to determine the future present value of the project returns at this proposal stage, but nevertheless very interesting especially if combined with assumptions on the increased capital value of the riparian property and tourism market created. This would be a study that could be undertaken during the initial stages of the project as this project could ultimately have massive returns if extended to all alien plant biomass.

4. ASSUMPTIONS, RISK AND ABATEMENT STRATEGIES

4.1 Assumptions

- That the Western Cape will not experience major natural disasters in the implementation phase that will affect the successful completion of the project.
• That all implementing agencies are able to conduct their service as they are presently doing
• That Casidra will be able to conduct the procurement at the high standard they have set to date
• That LandCare personnel do not resign and break the important link with the service providers

4.2 Risks

• Cannot implement the project due to natural disasters. Risk level - Medium.
• Cannot implement the project due to financial or human resource limitations. Risk level - Low.
• Cannot implement the project due to service providers not being able to implement projects. Risk level - Low.
• Cannot implement the River Protection project due to delays caused by the Environmental legislation. Risk level - Medium.

This project will prevent the risk of the destruction of the following infrastructure by the removal of large alien vegetation that could cause this destruction by clogging the river flow:

• 9 road and railway bridges worth more than R 400 million and that are vital to the rural economy
• 1 irrigation dam that supports the entire lower Berg River irrigation system
• Several irrigation weirs that feed the entire valley with irrigation water and produce important agricultural export crops and
• Agriculture is by far the major source of employment in the project area, without the constant supply of water this employment would be lost

4.3. Abatement Strategies

• If a natural disaster should occur and all projects where to stop, they would more than likely have to be redesigned and implemented at a later date. This would at most delay the final implementation.
• Should there be a major resignation of personnel from the implementing partnership, then another body will be chosen to procure and implement the projects.
• Environmental legislative requirements for river protection works have been discussed with relevant authorities and will be conducted as a matter of urgency in partnership with the authority. The worst case could be that the projects could be delayed due to the process.

5. OUTCOMES AND IMPACT

Environmental impact

This can only be described as a massive impact in restoring the river system to a place of beauty that delivers environmental services to all the people of the Cape Town Metro, from water, food, and a place of fun to rehabilitating a diverse biodiversity.

Social outcome

Employment to at least 50 full time positions, training of all personnel, equity opportunities are rare in projects of a physical nature but nevertheless we are geared for this challenge, health of all the
people that play, drink and use this water for domestic uses and the boost of new developments in the area will be a major positive contribution.

**Economic outcome**

The economic injection of a major development with long-term agricultural-tourism benefits, increased capital growth and reduction in irrigation water due to mulching will bring financial relief to many landowners and enable them to concentrate on protecting the new valuable resource.

**Adaptive impact of the project**

The river system is choked with alien plant vegetation that is causing a 1:10 flood to reach the same water flooding heights as a 1:50 flood. The removal of this vegetation and replacing of the indigenous vegetation has brought about and immediate relief from flooding and vulnerability to the higher downpours predicted with climate change conditions. The adaptive measure would also largely affect the water quality, as this will improve with natural filters and indigenous plants that line the new riparian zone.

**Project Status / Timeline**

The project is ready to roll and this pilot phase will assist in moving it quicker and in the right direction as mentioned previously. Due to the flexible implementing agency Casidra, the project could start almost immediately, stop for any disaster, and commence again without delays caused by “red Tape” in traditional public organisations.

6. **CONCLUSION AND THE IMPORTANT ROLE PLAYED BY EXTENSION OFFICERS.**

The greatest threat to biodiversity in the Western Cape region of South Africa is the infestation of alien plants, which has a major impact on our unique resource. This impact is exponentially experienced in the river systems as alien plants have infested the riparian zone to such an extent that very little of our rich river biodiversity that provides ecological services to use can survive and function.

This project could be the beginning of the end of alien plant infestation in South Africa. Bringing much needed employment, resource protection, economic development, tourism and further work opportunities in the rural areas. Training in new skills to the unemployed and above all it would allow the people to manage a resource that has adapted to cope with the threats of climate change.

This project illustrates the important role player by extension officers as summarised in the following bullets:

- No project is too big to tackle it just requires big thinking, that is what you have as an extension officer, use it.
- The building of partnerships with people that differ completely with one another is essential to the success of the project, your skills are essential in bringing people together to strive for a common goal.
- Choose your strong partners and focus on these important role players. Use your passion for people and massive impacts to fuel your energy and your strong partners towards your common goal.
- Think big, think diverse, think out of the box, think in the box, just never stop thinking and get all your partners to think and readapt your action to your thinking.
The protection of Natural systems is vital in your work and you as an extension officer play a pivotal role in implementing big projects and changing people’s way of thinking and respecting natural systems (The reality of a Changing Climate).

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1. INTRODUCTION

In most developing countries agriculture is a major sector of the economy and South Africa is no exception. Extreme meteorological events such as droughts and floods have the potential to increase pest and disease infestations, which can cause significant economic losses depending on the stage of agricultural activities when they occur.

The South African end-users of weather forecasts have up to now been largely supplied with skilful forecasts of probabilities indicating the likelihood of rainfall and temperature anomalies being above or below a certain predetermined threshold. Delivery and uptake of climate variability information is as substantial a challenge as the actual production of seasonal forecasts. An effective extension service plays a major role in the effectiveness of the flow of weather information from modellers to farmers. Currently in South Africa the resources invested thus far on the development of physical systems capable of providing reliable information on future outcomes outweigh those dedicated to the packaging of such information to end-users. It has already been established that there is limited uptake of seasonal forecast information especially by subsistence farmers (e.g. Archer, 2003; Johnston et al., 2007; Klopper & Landman, 2003). Timely availability of meteorological information and services could facilitate both strategic and tactical decisions in increasing and sustaining agricultural production.

Further stakeholder dialogue is needed to confirm the perceptions that subsistence farmers lack three things: skill, access and acceptance. A seasonal forecast does not necessarily have to have high skill for a particular location and time, but must state the skill that it has or does not have. Only once users have managed to engage with the forecasts can they begin to decide whether they are useful, so they must be available in a way that meets their needs, whoever they are. Dissemination methods, techniques and avenues need to be carefully planned so that the detail and usefulness of forecast information is not diluted or misinterpreted. Once they are accessible and informative the users may be able to assess them and their usefulness and ultimately accept them.

A clear quantification of the livelihood vulnerability can be used to assess the effect of agro meteorological information disseminated. With an ability to predict and mitigate climate variability through strategic planning, food security could be improved in southern Africa according to user surveys (Harrison & Graham, 2001). Vulnerability assessment describes a diverse set of methods used to thoroughly integrate and examine interactions between humans and their physical and social surroundings. In the late 19th century the field of climate vulnerability assessment emerged to address the need to quantify how communities will adapt to changing environmental conditions. Various researchers have tried to bridge the gap between the social, natural, and physical sciences and contributed new methodologies that confront this challenge (Polsky et al., 2007). Many of these rely

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53 Agricultural Research Council - Institute for Soil, Climate and Water, Private Bag X79, Pretoria 0001. Email: Phahlaneo@arc.agric.za
54 Agricultural Research Council - Institute for Soil, Climate and Water, Private Bag X79, Pretoria 0001.
55 Department of Geography, Geoinformatics and Meteorology, University of Pretoria, Private Bag X20 Hatfield, Pretoria, 0028.
56 Department of Agriculture, Forestry and Fisheries, Private Bag X250, Pretoria, 0001
heavily on the Intergovernmental Panel on Climate Change (IPCC) working definition of

The use of primary household data in developing the Livelihood Vulnerability Index (LVI) helps to
avoid the pitfalls associated with using secondary data. Berardi & Donnelly (1999) stated that there
are different strategies for obtaining information needed for research conducted with the support of
the population. Strategies would emphasize mutual respect and learning and be acceptable to the
community. Gingrich (2000) pointed out that in order for the investment in atmospheric observation,
science and services to result to remarkable dividends to the nation then all members of the
community – private, public and academic – must work together. Another advantage of using a
vulnerability index is the reduction in dependence on climate models which, despite recent advances,
are still presented at too large a scale to provide accurate projections at levels useful for community
development and planning (Patz et al., 2005).

2. MATERIALS AND METHODS

The LVI was developed to estimate livelihood vulnerabilities of subsistence farmers in six
municipalities in the Waterberg District of Limpopo Province, South Africa. A total of 137
households were surveyed and primary data was collected using questionnaires.

2.1. Description of the study area

Waterberg is one of five districts of Limpopo Province. It is located in western Limpopo, bordering
Gauteng, North West Province and Botswana. The district comprises six local municipalities, namely
Modimolle, Bela-Bela, Mookgophong, Lephalale, Thabazimbi and Mogalakwena. Mining,
agriculture and tourism are the major economic activities of Waterberg district.

2.2. Data collection

There are different methods of data collection such as direct observation and measurement, mail
questionnaire, telephone and personal interview (United Nations, 2005). As explained in Thornton et
al. (2006), during LVI development primary data was collected to minimize uncertainty associated
with data generated. According to Fussel & Klein (2006), primary data collection for LVI can be
divided into first-generation vulnerability assessment and second-generation assessment based on
climate impact assessments relative to baseline study and incorporation of adaptive study
respectively. The data recorded throughout the data collection period was subjected to several
statistical analysis procedures using Statistical Analysis Software (SAS, 1999). The data in this study
was collected in the form of questionnaires. Based on a sample size calculation by (WHO, 2005) a
95% confidence interval, 10% precision and 50% prevalence were set for statistical calculation.

2.3. Calculating the LVI

The LVI uses a balanced weighted average approach (Sullivan, 2002) where each sub-component
contributes equally to the overall index even though each major component is composed of a
different number of sub-components. Because we intended to develop an assessment tool accessible
to a diverse set of users in resource-poor settings, the LVI formula uses the simple approach of
applying equal weights to all major components. This weighting scheme could be adjusted by future
users as needed. Because each of the sub-components is measured on a different scale, it was first
necessary to standardize each as an index. The equation used for this conversion was adapted from
that used in the human development index to calculate the life expectancy index, which is the ratio of
the difference of the actual life expectancy and a pre-selected minimum, and the range of predetermined maximum and minimum life expectancy (UNDP, 2007).

The LVI was developed to estimate the impact of climate variability on subsistence farming at 10 villages in 4 districts of Limpopo Province. Data collection questionnaires were adapted from different studies including those of Sullivan et al. (2002) and Hahn et al. (2009). Data was collected on farmer’s network, socio-demographics, livelihoods, health, natural disasters and climate variability. The primary data collected from small-scale farmers was aggregated using a composite index and differential vulnerabilities were then compared between districts.

The LVI in this study includes seven major components: socio-demographic profile, livelihood strategies, social networks, health, food, water, and natural disasters and climate variability. Each is composed of several indicators or sub-components. Table 1 explains how each of the sub-components was quantified and also shows survey questions and their potential source of bias.

<table>
<thead>
<tr>
<th>Major components</th>
<th>Sub-components</th>
<th>Possible survey questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-demographic profile</td>
<td>Dependency ratio</td>
<td>Could you please list the ages and genders of every person who eats and sleep in your house. Include visitors who ate and slept in your house for the last 3 days.</td>
</tr>
<tr>
<td></td>
<td>Percent of female-headed households</td>
<td>Are you the head of the household?</td>
</tr>
<tr>
<td></td>
<td>Percent of households where head of household has not attended school</td>
<td>Did you ever go to school?</td>
</tr>
<tr>
<td></td>
<td>Percent of households with orphans</td>
<td>Are there any children less than 18 years old from other families living in your house because one or both of their parents has died?</td>
</tr>
<tr>
<td>Livelihood</td>
<td>Percent of households with family member working in a different community</td>
<td>How many people in your family go to a different community to work?</td>
</tr>
<tr>
<td></td>
<td>Percent of households dependent solely on agriculture as a source of income</td>
<td>Do you or someone in your family raise animals? Do you or someone on your family grow crops? Do you or someone from your family collect something from the bush, the forest and rivers to sell?</td>
</tr>
<tr>
<td></td>
<td>Average Agricultural Livelihood Diversification Index</td>
<td>Do you or someone in your family raise animals? Do you or someone on your family grow crops? Do you or someone from your family collect something from the bush, the forest and rivers to sell?</td>
</tr>
<tr>
<td>Health</td>
<td>Average time to health facility (minutes)</td>
<td>How long does it take to get to a health facility?</td>
</tr>
<tr>
<td></td>
<td>Percent of households with a family member with chronic illness</td>
<td>Is anybody in your family chronically ill (they get sick very often)?</td>
</tr>
<tr>
<td></td>
<td>Percent of households where a family member had to miss work or school in the last 2 weeks due to illness</td>
<td>Has anyone in your family been so sick in the past 2 weeks that they had to miss school or work?</td>
</tr>
<tr>
<td></td>
<td>Average malaria</td>
<td>Which months of the year is malaria particularly bad? How many mosquito nets do you have?</td>
</tr>
<tr>
<td>Social networks</td>
<td>Average Receive: Give Ratio</td>
<td>In the past month, did relatives or friends help you and your family (e.g. get medical care, sell animal products, take care of your children)? In the past month, did you and your family members help relatives or friends (choices same as above)?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td>Average Borrow: Lend Money Ratio</td>
<td>Did you borrow any money from relatives or a friend in the past month? Did you lend any money to relatives or friends in the past month?</td>
<td></td>
</tr>
<tr>
<td>Percent of households that have not gone to their local government for assistance in the past 12 months</td>
<td>In the past 12 months, have you or someone in your family gone to your community leader for help?</td>
<td></td>
</tr>
<tr>
<td>Percent of households dependent on family farm for food</td>
<td>Where does your family get most of its food?</td>
<td></td>
</tr>
<tr>
<td>Average number of months households struggle to find food</td>
<td>Does your family have adequate food the whole year, or are there times during the year that your family does not have enough food? How many months a year does your family have trouble getting enough food?</td>
<td></td>
</tr>
<tr>
<td>Average Crop Diversity Index</td>
<td>What kind of crops does your household grow?</td>
<td></td>
</tr>
<tr>
<td>Percent of households that do not save crops</td>
<td>Does your family save some of the crops you harvest to eat during a time of the year?</td>
<td></td>
</tr>
<tr>
<td>Percent of households that do not save seeds</td>
<td>Does your family save some seeds to grow the next year?</td>
<td></td>
</tr>
<tr>
<td>Percent of households reporting water conflicts</td>
<td>In the past year have you heard about conflicts over water in your community?</td>
<td></td>
</tr>
<tr>
<td>Percent of households that utilize a natural water source</td>
<td>Where do you collect your water from?</td>
<td></td>
</tr>
<tr>
<td>Average time to water source (minutes)</td>
<td>How long does it take to get to a water source?</td>
<td></td>
</tr>
<tr>
<td>Percent of households that do not have a consistent water supply</td>
<td>Is there water available every day?</td>
<td></td>
</tr>
<tr>
<td>Inverse of the average number of litres of water stored per household</td>
<td>What containers do you usually store water in? How many? How many litres are they?</td>
<td></td>
</tr>
<tr>
<td>Average number of floods, drought veld fires, flash floods, frost and events in the past 6 years</td>
<td>How many times has this area been affected by floods, cyclone drought in the past 6 years?</td>
<td></td>
</tr>
<tr>
<td>Percentage of households that did not receive a warning about the pending natural disaster</td>
<td>Did you receive a warning about the floods, drought or cyclone before it happened?</td>
<td></td>
</tr>
<tr>
<td>Percent of households with injury, damage or death as a result of the most severe natural disaster in the past 6 years</td>
<td>Was anyone in your family injured in the flood, drought or cyclone? Did anyone in your family die during the flood, drought or cyclone?</td>
<td></td>
</tr>
<tr>
<td>Mean monthly standard deviation of the daily average maximum temperature</td>
<td>Period of best available data weather data from the local weather station</td>
<td></td>
</tr>
<tr>
<td>Mean monthly standard deviation of the daily average minimum temperature</td>
<td>Period of best available weather data from the local weather station</td>
<td></td>
</tr>
<tr>
<td>Mean monthly standard deviation of average precipitation</td>
<td>Period of best available weather data from the local weather station</td>
<td></td>
</tr>
</tbody>
</table>

Since the one of the objective is to develop an assessment tool accessible to a diverse group of users, equal weights were applied to all the seven major components of the LVI formula. Each of the seven sub-components was measured on a different scale, therefore they were standardized as an index. The equation used to standardize the indexes was adopted from the method used in the human
development index to calculate the life expectancy index as indicated below (UNDP, 2007; Hahn et al., 2009).

\[
index_{s_d} = \frac{s_d - s_{min}}{s_{max} - s_{min}}
\]  

Equation 1 describes the standardization of each of the seven sub-components used to determine the LVI. \(s_d\) is the original sub-component for district \(d\) and \(s_{max}\) and \(s_{min}\) are the maximum and the minimum of values respectively, for each of the seven sub-components determined by using the data from the four districts. After each sub-component was standardized, they were then averaged using equation 2 to calculate the value of each major component.

\[
M_d = \frac{\sum_{i=1}^{n} index_{s_{di}}}{n}
\]

where \(M_d\) is one of the seven major components for district \(d\), index \(s_{di}\) represent the sub-component, indexed by \(i\), that make each major component, and \(n\) is the number of sub-component in each component.

After calculating the values for each of the seven major components for each of the four districts, equation 3 was used to determine the LVI at a district level.

\[
M_d = \frac{\sum_{i=1}^{7} w_M M_{di}}{\sum_{i=1}^{7} w_M}
\]

3. RESULTS AND DISCUSSION

3.1. Description of sampled data

The sampled data comprises 29% females and 71% males, where 77% of the sampled households are owners of the farming plots. Type of land ownership in the six municipalities is 57% communal land, 25% rented land and only 18% is private land. The farming activities in the Waterberg district consist of 30% crops, 37% livestock and 33% other activities. The highest educational levels for family members in the six municipalities include 53% being below grade 12, 27% having grade 12 and 20% above grade 12.

3.2. Benefits of the LVI

The LVI could be used to assess the impact of a programme or policy by substituting the value of the indicator that is expected to change and recalculating the overall vulnerability index. For example, if the goal of a water sector intervention is to decrease the travel time to a community’s primary water source, the target travel time could be incorporated and a new LVI calculated. The new LVI could then be compared with the baseline LVI to estimate the intervention’s effect on the community’s climate vulnerability.

3.3. LVI description

The results in Table 2 show a high level of livelihood vulnerability in all the municipalities. The LVI is on a scale from zero (least vulnerable) to 0.5 (most vulnerable). Mogalakwena indicated the highest level of livelihood vulnerability (0.379) whilst Modimolle indicated the lowest level of vulnerability (0.292). The sub-component livelihood strategy has the highest value in Mogalakwena whilst Modimolle indicated the lowest value for the sub-component of health. Social networks and
natural disaster and climate variability have high values as compared to the other sub-components while health has the lowest values.

Table 2: Livelihood Vulnerability Index (LVI) sub-component values for each municipality in Waterberg District

<table>
<thead>
<tr>
<th>Sub-Component</th>
<th>Mookgopong</th>
<th>Lephalale</th>
<th>Modimolle</th>
<th>Thabazimbi</th>
<th>Mogalakwena</th>
<th>Bela-Bela</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio Demographic Profile</td>
<td>0.0984626</td>
<td>0.081746521</td>
<td>0.12176</td>
<td>0.193067</td>
<td>0.104514</td>
<td>0.082267</td>
</tr>
<tr>
<td>Livelihood Strategies</td>
<td>0.2814873</td>
<td>0.372292897</td>
<td>0.314493</td>
<td>0.374075</td>
<td>0.644365</td>
<td>0.349419</td>
</tr>
<tr>
<td>Social Networks</td>
<td>0.3971668</td>
<td>0.409427929</td>
<td>0.402469</td>
<td>0.346825</td>
<td>0.414001</td>
<td>0.34465</td>
</tr>
<tr>
<td>Health</td>
<td>0.1615599</td>
<td>0.256761614</td>
<td>0.117061</td>
<td>0.268869</td>
<td>0.233104</td>
<td>0.18454</td>
</tr>
<tr>
<td>Food</td>
<td>0.3457141</td>
<td>0.24041515</td>
<td>0.32261</td>
<td>0.452758</td>
<td>0.434028</td>
<td>0.384575</td>
</tr>
<tr>
<td>Water</td>
<td>0.3050995</td>
<td>0.316921634</td>
<td>0.229171</td>
<td>0.266071</td>
<td>0.315828</td>
<td>0.34551</td>
</tr>
<tr>
<td>Natural Disaster and Climate Variability</td>
<td>0.4873143</td>
<td>0.51918825</td>
<td>0.533266</td>
<td>0.535209</td>
<td>0.50477</td>
<td>0.549613</td>
</tr>
<tr>
<td>LVI</td>
<td><strong>0.2966864</strong></td>
<td><strong>0.313821999</strong></td>
<td><strong>0.291547</strong></td>
<td><strong>0.348125</strong></td>
<td><strong>0.378658</strong></td>
<td><strong>0.320082</strong></td>
</tr>
</tbody>
</table>

In Table 3 the t Critical two-tail result is 2.4469, which is above the null hypothesis mean of 2; this means that there is no significant difference between the two means of 0.379 and 0.29 of Modimolle and Mogalakwena respectively. The t-Test results indicate that there is no significant difference between the six means. The livelihood vulnerability does not differ in all the six municipalities.

Table 3: t-Test Paired two sample for means

<table>
<thead>
<tr>
<th></th>
<th>Modimolle</th>
<th>Mogalakwena</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.291547</td>
<td>0.378658</td>
</tr>
<tr>
<td>Variance</td>
<td>0.022564</td>
<td>0.031851</td>
</tr>
<tr>
<td>Observations</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>0.734108</td>
<td></td>
</tr>
<tr>
<td>Hypothesized Mean Difference</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>df</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>t Stat</td>
<td>-1.87839</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) one-tail</td>
<td>0.0547</td>
<td></td>
</tr>
<tr>
<td>t Critical one-tail</td>
<td>1.94318</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) two-tail</td>
<td>0.109399</td>
<td></td>
</tr>
<tr>
<td>t Critical two-tail</td>
<td>2.446912</td>
<td></td>
</tr>
</tbody>
</table>

4. CONCLUSION

This practical approach may be used to monitor vulnerability, programme resources for assistance in policy or project effectiveness in data scarce regions by introducing scenarios into the LVI model for baseline comparisons. Therefore a thorough understanding of the vulnerability index can be used by resource managers to better implement their management strategies to improve food security and minimize the impact of weather related disasters. Dissemination methods, techniques and avenues need to be carefully planned so that the detail and usefulness of measures to minimize the impact of natural disasters like forecast information is not diluted or misinterpreted. Once they are accessible
and informative the users may be able to assess them and their usefulness and ultimately accept them.

REFERENCES


ADOPITION OF SOIL CONSERVATION AGRICULTURE BY FARMERS AS A STRATEGY FOR SUSTAINABLE AGRICULTURAL PRODUCTION IN SHISELWENI REGION OF SWAZILAND.

Jibowo, A. A., Akeredolu, M. & Mdluli, N. V.

ABSTRACT

Land degradation has been an endemic challenge militating against sustainable agricultural production in Swaziland. Soil conservation agriculture was introduced by the Ministry of Agriculture and Cooperatives to address the challenge, and consequently improve sustainable food production. The purpose of this study was to determine the adoption of soil conservation agricultural practices by farmers in the Shiselweni Region of Swaziland. The study specifically identified the sources of information and training providers on conservation agriculture, CA; determined the adoption of CA practices by farmer, and benefits derived by farmers from practising conservation agriculture. The study also tested the null hypothesis that there was no significant relationship between the adoption of CA and socio-economic characteristics of respondents including age, sex, level of education, number of years the farmers had been in the area, and number of people who assisted the farmers in the field. A valid and reliable interview schedule, with a reliability coefficient of 0.81, was used to collect data from 120 respondents which included 60 adopters and 60 non-adopters of CA who were selected through purposive sampling technique, based on whether respondents practised CA or did not, in January and February, 2013. Results showed that Extension Agents (100%), neighbours and friends (100%), and radio (100%) were the major sources of information on CA. The Ministry of Agriculture and Cooperatives was the main training provider. The main CA practices adopted by farmers included zero/minimum tillage, crop rotation, and grass strips cultivation (100%). The benefits derived from practising CA included high crop yield, sustainability of crop production to various weather conditions, and prevention of loss of soil nutrients. The major challenge was use of farm tools and draught animals. There was a significant relationship between formal education ($\chi^2 = 10.44, p \leq 0.05, C = 0.28$), years of community residence ($\chi^2 = 15.58, p \leq 0.05, C = 0.34$), number of people assisting on the farm ($\chi^2 = 26.60, p \leq 0.05, C = 0.43$), and adoption of CA. The contingency coefficient, C showed a strong relationship in each case. In conclusion, only some CA practices were adopted. It was therefore recommended that efforts should be made by the Ministry of Agriculture and other extension delivery agencies to intensify efforts for adoption of CA practices by farmers.

KEY WORDS: Conservation agriculture, adoption, farmers, challenges, benefits

I. INTRODUCTION

1.1 Conservation agriculture

According to FAO (2007), conservation agriculture is defined as a concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment. Conservation agriculture (CA) aims to achieve sustainable and profitable agriculture and subsequently improved livelihoods of farmers through the application of three basic CA principles, namely minimal soil disturbance, permanent soil cover and crop rotation. Minimal soil disturbance is to ensure sufficient biomass for
soil and water conservation and erosion control (Dumanski, et al., 2006). Soil cover is a natural fertilizer which comes from organic matter kept on soil surface (FAO, 2008). Crop rotation involves changing of crops planted on the same plot every season to improve soil structure (FAO, 2008), and control crop diseases (Hobbs et al., 2007).

CA holds tremendous potential for all sizes of farms and agro-ecological systems, but its adoption is, perhaps, most urgently required by smallholder farmers, especially those facing acute labour shortages. It is a way to combine profitable agricultural production with environmental concerns and sustainability, which has been proven to work in different places and farming systems. The advantages of CA are (1) economic, as it saves labour costs which would have been needed to procure and apply farm inputs like fertilizers, (2) agronomic, because less agronomic practices such as disease control are involved, and (3) environmental, such as reduction in the need to spray pest control chemicals, preservation of biomass (Lal, 1995), reduction of run-off and soil erosion (Mlipha, 2010), water conservation, and dust suppression (FAO, 2006).

CA can help in ensuring food security by meeting two conditions. One condition is ensuring that there are adequate food supplies available, through domestic production. The other is ensuring that households whose members suffer from malnutrition have the ability to acquire food, through other services.

According to Masimula (2010), CA was introduced in Swaziland in 2003, and the very first beneficiaries were farmers from KaShewula community. It was introduced to 10 farmers by an Italian non-governmental organisation, COSPE, (Cooperation for the Development of Emerging Countries) with funds from FAO. CA was of a high priority in Swaziland, and a number of stakeholders supported its advocacy to farmers. The main reason for introducing CA into the country was that soils in the country were no longer fertile enough to support optimal crop yield, because some of the farming systems practised by farmers had contributed to soil degradation, which led to poor food production.

The methods used in CA include strip cultivation, contour ploughing, minimum tillage, agro-forestry, crop rotation, etc. (FAO, 2007). The practice enhances biodiversity and natural biological processes above and below the ground surface. Soil interventions, such as mechanical tillage, are reduced to minimum or direct planting, and external inputs, such as agrochemicals and plant nutrients of mineral or inorganic origin, are applied in ways and quantities that do not interfere with, or disrupt the biological processes. Conservation agriculture facilitated good agronomy, like timely operations, and improves land and crop husbandry practices for both rain-fed and irrigated production. Complemented by other known good practices, including the use of good quality seeds, and integrated pest, nutrient, weed and water management, and other practices, CA serves as a base for sustainable agricultural production intensification. This study assessed the adoption of conservation agriculture, specifically in Shiselweni Region of Swaziland.

1.2 Specific Objectives

The specific objectives of the study were, to:

1. Identify the sources of knowledge and training providers on CA in the Shiselweni Region of Swaziland;

2. Determine the application/ adoption of CA practices by the farmers; and

3. Describe the benefits farmers derived from practising CA.
1.3 Hypothesis

Null Hypothesis, \( H_0 \)
There was no significant relationship between the adoption of CA and socio-economic characteristics of respondents including age, sex, level of education, number of years the farmers had been in the area, and number of people who assisted the farmers in the field.

Alternative Hypothesis, \( H_1 \)
There was a significant relationship between the adoption of CA and socio-economic characteristics of respondents include age, sex, level of education, number of years the farmers had been in the area and number of people who assisted the farmers in the field.

2. METHODOLOGY

2.1 Population and sample

The population studied was all farmers in the Shiselweni Region of Swaziland. A random sample of 60 non-adopters of conservation agriculture, and a sample of 60 adopters of CA chosen by the snowball sampling technique, was included in the study.

2.2 Instrumentation, validity and reliability

An interview schedule which solicited information to obtain data on the objectives of the study was developed and used for data collection from the respondents. Adoption of CA was measured by asking farmers to indicate the CA methods which they practised on their farms. Validity of the instrument was ensured by asking two literate farmers who practiced CA in Manzini Region of Swaziland, and two lecturers in the Department of Crop Production who were knowledgeable in CA, to complete the interview schedule and include suggestions for improvement in the content, to ensure content validity. Reliability of the instrument was found by the test-retest technique. Thirty farmers from Manzini Region were asked to complete the interview schedule twice at an interval of two weeks. A correlation coefficient of 0.806 found between the two responses constituted the reliability coefficient, which showed that the instrument was reliable. A research notebook was also used for data collection.

2.3 Data collection and analysis

Data collection took place during the months of January and February, 2012. Interviews were conducted with the respondents by the researchers, using the interview schedule. Sixty adopters and 60 non-adopters of CA were interviewed, and their responses were recorded in the interview schedule. A research notebook was used to record field observations which were relevant to the study, to supplement the information collected with the interview schedule. Frequencies, percentages and Chi-Square analysis with Contingency Coefficient, were used for data quantification. The Chi-Square tested the significance of the relationship between CA and some demographic characteristics of the respondents. The Contingency Coefficient, \( C \) was used to establish the degree of the strength of the association between CA and some demographic characteristics. The values of \( C \) can be interpreted as correlation coefficient (Bernard, 1975). The values of \( C \) were therefore interpreted by following Davis (1971). In Davis scale of descriptors, a correlation coefficient \( r \) of 1 represents perfect association; 0.70 to 0.99 = very high association; 0.50 – 0.69 = substantial association; 0.30 – 0.49 = moderate association; 0.10 – 0.29 = low association; 0.01 – 0.09 = negligible association.
3. FINDINGS AND DISCUSSION

3.1 Sources of knowledge on Conservation Agriculture, CA

Data in Table 1 show that all the farmers who adopted CA obtained information on CA from Extension Agents (100%), neighbours and friends (100%), and radio (100%). Nearly all the respondents received information from television (96.7%), and newspapers (95%), possibly on their visits to urban areas which commonly have the media.

3.2 Training providers on CA

Most (96.7%) of the farmers received training on CA from the Ministry of Agriculture and Cooperatives (Table 1). Some received training from Non-governmental Organizations including African Cooperative Action Trust, ACAT, (30%), and World Vision (16.7%) (Table 1). Government parastatal organizations including Maize Corporation which markets maize (3.3%), and NAMBOARD hardly provided training on CA.

3.3 Crops grown and crop association

The crops predominantly grown under CA practices were cereals (100%) and legumes (86.7%). Cucurbits such as cucumber (1.7%) and vegetable crops (0%) were scarcely or not grown. Hence the crops grown together (crop association) were mainly cereals and legumes (88.3%) (Table 1).

| Table 1 Information sources, training providers, crops grown and crop association in CA |
|-----------------------------------------|---------|---------|
| Information sources                  | Yes %    | No %    |
| Extension Agents                    | 60 100   | 0 0.0   |
| Neighbours and friends              | 60 100   | 0 0.0   |
| Radio                                | 60 100   | 0 0.0   |
| Television                          | 58 96.7  | 2 3.3   |
| Newspapers                          | 57 95    | 3 5     |
| Training providers                  |          |         |
| Ministry of Agric & Coop.           | 58 96.7  | 2 3.3   |
| ACAT                                 | 18 30    | 42 70   |
| World Vision                        | 10 16.7  | 50 83.3 |
| Maize Corporation                   | 2 3.3    | 58 96.7 |
| NAMBOARD                             | 0 0      | 60 100  |
| Banks                                | 0 0      | 60 100  |
| Crops grown                         |          |         |
| Cereal crop                         | 60 100   | 0 0     |
| Legume crop                         | 52 86.7  | 8 13.3  |
| Pulse crops                         | 15 25    | 45 75   |
| Cucurbits                           | 1 1.7    | 59 98.3 |
| Vegetable crop                      | 0 0.0    | 60 100  |
| Crop association                    |          |         |
| Cereal +legume                      | 53 88.3  | 7 11.7  |
| Cereal +pulse                       | 15 25    | 45 75   |
| Cereal+cucurbits                    | 0 0.0    | 60 100  |
| Cereal +vegetables                  | 0 0.0    | 60 100  |
3.4 Adoption of CA practices by farmers

Majority of the respondents with a mean of 87.7% adopted five of the thirteen CA practices (Table 2). These included minimum tillage (100%), crop rotation (100%), planting grass strips between fields (100%), crop association (76.7%), and crop residue retention (61.7%). The remaining eight recommended CA practices were adopted by few respondents with a mean of 18.9 percent. These included cover cropping (35.0%), contour ploughing (31.7%), strip cultivation (30.0%), agro-forestry (25.0%), planting wind brakes (21.7%), and zero tillage or no till (8.3%), alley farming (0%), and terracing (0%). Majority (61.5%) of the CA practices were not popularly adopted by farmers.

Table 2 Methods of CA adopted by the farmers (N=60)

<table>
<thead>
<tr>
<th>Method of CA</th>
<th>Yes</th>
<th>%</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum tillage</td>
<td>60</td>
<td>100.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Crop rotation</td>
<td>60</td>
<td>100.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Planting grass strips in between fields</td>
<td>60</td>
<td>100.0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Crop association</td>
<td>46</td>
<td>76.7</td>
<td>14</td>
<td>23.3</td>
</tr>
<tr>
<td>Crop residue retention</td>
<td>37</td>
<td>61.7</td>
<td>23</td>
<td>38.3</td>
</tr>
<tr>
<td>Cover crop</td>
<td>21</td>
<td>35.0</td>
<td>39</td>
<td>65.0</td>
</tr>
<tr>
<td>Contour ploughing</td>
<td>19</td>
<td>31.7</td>
<td>41</td>
<td>68.3</td>
</tr>
<tr>
<td>Strip cultivation</td>
<td>18</td>
<td>30.0</td>
<td>42</td>
<td>70.0</td>
</tr>
<tr>
<td>Agr-forestry</td>
<td>15</td>
<td>25.0</td>
<td>45</td>
<td>75.0</td>
</tr>
<tr>
<td>Planting wind brakes</td>
<td>13</td>
<td>21.7</td>
<td>47</td>
<td>78.3</td>
</tr>
<tr>
<td>No-till ploughing</td>
<td>5</td>
<td>8.3</td>
<td>55</td>
<td>91.7</td>
</tr>
<tr>
<td>Alley farming</td>
<td>0</td>
<td>0.0</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>Terracing</td>
<td>0</td>
<td>0.0</td>
<td>60</td>
<td>100.0</td>
</tr>
</tbody>
</table>

3.5 Benefits derived from CA by farmers

All the farmers derived many benefits from CA. The benefits included high crop yield, sustainability of agricultural production in all kinds of weather conditions, reduced costs of farm inputs, environmental protection, retention of soil nutrients, prevention of pits and gorges (100%) (Table 3).
Table 3 Benefits derived by farmers from CA (N=60)

<table>
<thead>
<tr>
<th>CA benefits</th>
<th>Yes</th>
<th>%</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>High crop yield</td>
<td>60</td>
<td>100</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Sustainability to all kind of weather condition</td>
<td>60</td>
<td>100</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Saving farm inputs, machinery and equipment</td>
<td>60</td>
<td>100</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Environmental protection</td>
<td>60</td>
<td>100</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Prevent loss of soil nutrients</td>
<td>60</td>
<td>100</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Saving labour costs</td>
<td>2</td>
<td>3.3</td>
<td>58</td>
<td>96.7</td>
</tr>
</tbody>
</table>

3.6 Relationship between socio-economic characteristics and adoption of CA

Formal education and adoption of CA
Data in Table 4 show that there was a significant association between formal education and adoption of CA ($\chi^2 = 10.44, \text{df} = 4, P = 0.05, C = 0.28$). The Contingency Coefficient showed a low level of association. Detailed analysis showed that a higher percentage (28.3%) of adopters than non-adopters (16.8%) had tertiary education. Education therefore predisposed farmers to adoption of CA.

Years community residence and adoption of CA
Years of residence in the community was significantly associated with adoption of CA ($\chi^2 = 15.58, \text{df} = 2, P = 0.05, C = 0.34$). The Contingency Coefficient showed a moderate strength of association. Detailed data showed that a greater percentage (56.6%) of adopters than non-adopters (30%) lived between 10–29 years in the area. On the other hand, a smaller percentage (6.7%) of adopters than non-adopters (36.7%) had been in the area for over 50 years. Hence adopters had lived in the area for a moderately long period of time to stabilize in the area, but not too long to be no more very active in agriculture.

Number of people assisting in farm work and adoption of CA
Number of people assisting in farm work was significantly associated with adoption of CA ($\chi^2 = 26.60, \text{df} = 2, P = 0.05, C = 0.43$). The Contingency Coefficient showed a moderate strength of association. Detailed analysis showed that a smaller percentage (8.3%) of adopters than non-adopters (50%) was assisted by 1-3 people. A high percentage (55%) of adopters than non-adopters (36.7%) was assisted by 4-6 people in their farms. Hence adopters had more assistance on the farm than non-adopters. This was consistent with expectation because more hands were needed to carry out conservation agricultural practices, than needed for regular farm practices.

Age, sex and adoption of CA
Age and sex of respondents were not significantly associated with adoption of CA at $P = 0.05$. Adopters and non-adopters were similarly represented at various age levels and between male and female respondents. However, detailed data show that females (60%) were more represented among adopters than males (40%), while males (56.7%) were more represented among non-adopters than females. Hence, females seem to practice CA more than males. Adopters were mainly those below the age of 60 (81.7%), while non-adopters were largely 60 years of age and above (61.6%).
Table 4 Chi-Square analysis of the association between adoption of conservation agriculture and socio-economic characteristics

<table>
<thead>
<tr>
<th>Socio-economic characteristics</th>
<th>χ² cal.</th>
<th>χ² tab</th>
<th>df</th>
<th>P</th>
<th>Decision</th>
<th>C</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal education</td>
<td>10.44</td>
<td>9.49</td>
<td>4</td>
<td>0.05</td>
<td>S</td>
<td>0.28</td>
<td>Low</td>
</tr>
<tr>
<td>Years of residence in the area</td>
<td>15.58</td>
<td>5.99</td>
<td>2</td>
<td>0.05</td>
<td>S</td>
<td>0.34</td>
<td>Moderate</td>
</tr>
<tr>
<td>No. of people assisting on farm</td>
<td>26.60</td>
<td>5.99</td>
<td>2</td>
<td>0.05</td>
<td>S</td>
<td>0.43</td>
<td>Moderate</td>
</tr>
<tr>
<td>Age</td>
<td>4.18</td>
<td>7.82</td>
<td>3</td>
<td>0.05</td>
<td>NS</td>
<td>0.18</td>
<td>Low</td>
</tr>
<tr>
<td>Sex</td>
<td>3.34</td>
<td>3.84</td>
<td>1</td>
<td>0.05</td>
<td>NS</td>
<td>0.17</td>
<td>Low</td>
</tr>
</tbody>
</table>

χ² cal. = Chi-Square calculated, χ² tab = Chi-Square tabulated, df = degree of freedom, P = Probability level, S = Significant, NS = Not Significant, C = Contingency Coefficient, SA = Strength of Association

4. CONCLUSIONS

The following conclusions were derived from the study:

4.1 The main sources of knowledge on conservation agriculture, CA, were the Extension Agents from the Ministry of Agriculture and Cooperatives, neighbours, radio, television and newspapers. The Ministry of Agriculture and Cooperatives was the major source of training farmers on CA. African Cooperative Action Trust, ACAT, and World Vision provided training to some of the farmers.

4.2 Majority of farmers did not adopt most of the CA practices. The main CA practices adopted by farmers were minimum tillage, crop rotation and planting grass strips between fields. Farmers also practised crop association and crop residue retention. Few farmers practised planting cover crops, contour ploughing, strip cultivation, agro-forestry, planting wind brakes, and no-till. Alley farming and terracing were not adopted by farmers.

4.3 Conservation agriculture provided many benefits to farmers who practised it. The benefits included high crop yield, sustained crop production in all kinds of weather conditions, use of less quantities of farm inputs, machinery and equipment, environmental protection, retention of soil nutrients, prevention of land pits and gorges.

4.4 Formal education, optimum number of years of community residence (10-29), number of people assisting on the farm, were significantly related to adoption of conservation agricultural practices. Adopters had higher formal education, and greater number of people assisting on the farm than non-adopters. A greater percentage of adopters than non-adopters had an optimum number of years of community residence.

5. RECOMMENDATIONS

5.1 The Ministry of Agriculture and Cooperatives and the Non-governmental Organizations such as African Cooperative Action Trust, ACAT, and World Vision should intensify their activities in assisting farmers to adopt conservation agriculture, CA, practices. The National Marketing Board, NAMBOARD, should also intensify its activities with farmers on conservation agriculture.

5.2 Training of farmers on conservation agriculture should include intensifying cultivation of pulse crops, cucurbits and vegetables. Farmers should also be trained to practise crop associations including planting cereals with cucurbits, and cereals with vegetables.

5.3 Extension teaching of farmers on adoption of CA practices should include planting cover crops, contour ploughing, strip cultivation, agro-forestry, planting wind brakes, no-till of land, terracing and alley farming.
5.4 Extension agents should intensify efforts at teaching CA with farmers who have limited formal education, those who have lived in the community for less than 10 years, and farmers with very few helping hands on the farm.

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ASSESSMENT OF THE ECONOMIC IMPACT OF SMALL HOLDER PIG FARMERS IN THE EDEN MUNICIPALITIES, SOUTHERN CAPE, REPUBLIC OF SOUTH AFRICA.

Senyatsi, K.60

Key words: Small holder pig producers, Eden, investigation, semi-structured interviews, alternative food source, market development, system development.

1. INTRODUCTION

From early times, pig farming appeared to be a general and common practice amongst the indigenous people of the Western Cape Province. People practiced subsistence pig farming as a means of survival and also for cultural purposes (Personal communication, Mr William Christians, 2005). Pig keeping allows households to generate supplementary income in peri-urban slums and rural areas.

According to FAO (2011), the definition of smallholder pig production varies among countries. Smallholders defined, vary between countries from less than 5 up to 20 sows.

Small holder pig production is practiced where agricultural by-products like maize bran, wheat, rice polishing, oil cakes, garbage are available as feedstuffs. In a few areas pigs are kept to provide manure for vegetable gardens and consecutively vegetable wastes are fed to the pigs (Kaumbata, 2009).

Most of small holder farmers live on peri-urban commonages. The living environment provides space to venture into farming practices and smallholder business activities, should such opportunities arise.

The aim of this presentation is to present the results of a case study on production systems used by smallholder pig farmers in the Eden district, portraying the key challenges faced by these farmers as well as successful strategies adopted by leading farmers. The area comprise of the Southern Cape Coastal area with temperate climate and the inland harsh arid Klein Karoo.

2. METHODOLOGY

From a preliminary survey conducted, 61 smallholder producers were randomly sampled and interviewed (2010) through investigative questionnaires. Producers were stratified according to criteria set for scale of operation and then classified specialists’ assessment on sustainability and profitability of the operation. Five of these piggeries were then purposely sampled on the above criteria for further investigation.

Data from these five selected producers was collected through more comprehensive semi structured interviews on scale of operation, production practices, housing, breeding, feeding, feed sources used, marketing and economy. Data was analysed by means of content and narrative analysis.

3. RESULTS AND DISCUSSION

Western Cape Government: Department of Agriculture, Farmer Support and Development, Extension and Advisory Services, P O Box 249, George, 6530. Tel Number: +27 44 803 3711. Email: kgodis@elsenburg.com
The preliminary survey of 61 producers within the Eden district municipality revealed the following distribution on scale of production:

- Subsistence (Less than 5 sows) - 77.5% ,
- Small holders (6 to 20 sows) - 18.5%,
- Commercial (More than 20 sows) - 3.7%.

Five producers for the detailed case study were selected. The selected producers comprised of four males and one female. Producer age ranged from 50 to 61 years, with pig production experience ranging from 3 to 30 years. Piggeries are located from 0.5 to 26.0 km from the nearest residential areas.

3.1 Breeds and breeding practices

It was found that the breeds used for production are chiefly Large White, Landrace crosses sourced from neighbouring with one producer using pure Large White. Observations show that the breeds and/or crosses used for production, seem to have adapted well to sub-optimal housing conditions, alternative feedstuffs and environments varying from temperate to arid conditions.

The average live litter size varies from 6.3 to 12.5 per sow, with sows farrowing one to two times per annum (Table 1). This is lower than in commercial operations and is mainly due to factors such as poor nutrition, housing and the age of the sows. Due to more exposure to the environment, mortalities are unacceptably high in winter. This has resulted in some of the respondents to move farrowing mainly to the hotter months of the year.

Table 1: Average piglets born alive per litter for five interviewed smallholder pig producers in the Eden district (2013)

<table>
<thead>
<tr>
<th></th>
<th>Farmer A</th>
<th>Farmer B</th>
<th>Farmer C</th>
<th>Farmer D</th>
<th>Farmer E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of</td>
<td>11.27</td>
<td>6.3</td>
<td>10</td>
<td>9.3</td>
<td>12.5</td>
</tr>
<tr>
<td>piglets born alive per</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>litter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-weaning mortality</td>
<td>3.2</td>
<td>6.3</td>
<td>20</td>
<td>19.8</td>
<td>14.5</td>
</tr>
<tr>
<td>(%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culling age of sows</td>
<td>3-4yrs</td>
<td>5-10yrs</td>
<td>4-5yrs</td>
<td>4yrs</td>
<td>3-4</td>
</tr>
</tbody>
</table>

All producers interviewed prefer to select their own gilts for breeding. Traits considered during selection of gilts are mainly the number of teats and conformation. The decision criteria for time of first breeding of gilts are based on age of the gilt rather than on the weight of the gilts (two producers). Age criteria for breeding of gilts are 6 months to 12 months.

The reasons given for the culling of breeding sows are stated as based on reproduction performance. The main criteria given for culling is lowered litter size, although detailed individual performance is not always known because sows are not individually identified. From Table1 it may be seen that some sows are kept back for breeding for up to 10 years.

Boars are also kept for as long as they are active or as soon as they become too big for the sows. Forty percent of interviewed producers use a boar for only a year and trade it as a breeding boar at about 2 years of age, to increase returns. In camp systems mating is unsupervised, and sows are left with the boar until all sows show signs of pregnancy.
Piglets are weaned at 5-8 weeks of age depending on the condition and size of the piglets. The weaning weight is usually unknown because farmers do not have scales to weigh the piglets.

3.2 Nutrition

High feed prices make it difficult for producers in this category to supply optimal nutritional requirements for their pigs. Producers therefore compromise scientific prescribed rations with cheaper and locally available feed. Available feed sources vary with area and season. Seasonal feed sources used are fruits from fruit producers (Klein Karoo) and vegetables obtained from commercial farmers, pack-houses and supermarkets. Cheese factory by-products such as whey and sub standard cheese are sourced from factories in the George (Coastal) and Ladismith (Klein Karoo) areas. One producer in the Southern Cape sources colostrum and cracked eggs from neighbouring dairy and layer farms which forms the basis of her pig rations. Fruit, vegetables, colostrum, cracked eggs and sometimes whey are available free of charge with only transport costs involved. Cheese and whey powder cost as little as R1.00/kg. Producers sometimes reimburse feed suppliers with a pig or two as a token of appreciation. However, by-product feed sources as indicated above is limited and therefore not available to all pig producers in the area. Commonly available feed sources are by-products from feed milling companies; such as sweepings, pollard, bran and hominy chop. Producers also try to lower feed costs by mixing own rations from locally available feed sources such as maize meal, lucerne, wheat, rye and oats. The nutritional content of the rations is unknown because the rations are not analysed. Producers usually mix one basic ration that is fed to pigs at all production stages.

The provision of drinking water is through water troughs or containers provided. Whey water is also used as drinking water at two units. The quantity of feed given is not known, as pigs are mostly kept and fed in groups rather than individually.

Lee (2013) defines swill as the traditional name for the feeding of food scraps and other waste material to pigs. Prohibited food materials include meat, meat products, carcass or any part of the carcass, restaurant waste or anything that has been in contact with any of the prohibited material. The interviews have shown that producers understand the dangers of feeding swill and stated that they do not feed swill to their pigs. Examples of the different types of feed used are presented in figure 1.

Fig 1. Examples of fruit and cheese factory waste sourced as pig food.

3.3 Housing

Pig houses do not only protect pigs from prevailing weathers that might negatively affect the fertility/productivity of the pig, but also ease management and protect pigs from parasites. Smallholder pig producers make use of low cost housing material for construction of pig houses. Surveyed piggeries make use of both earthen floors and concrete floors. Hygiene of the pens is also a
challenge, with poor waste management being the root cause of poor hygiene especially on farms with concrete floors (see Figure 2).

During rainy seasons breeding is temporarily discontinued due to bad housing conditions that do not protect pigs from the rain and cold. Cold and wet conditions are the cause of poor growth and high pre-weaning mortality.

Only boars and lactating sows are housed individually, while pregnant sows and growers are housed in groups. Grower pigs are however not always housed according to their sizes or age, due to limited space.

Pigs are also housed in A-frame huts within camps by three producers interviewed with two using camped systems with partly roof back laying areas. The problem encountered with pigs in camps is the breaking out of the pigs. Due to high electricity costs, farmers do not use electric fence that can prevent the pigs from breaking out.

Pens with concrete floors are stated to be cleaned daily with water whereas pens with earthen floors are cleaned once in a week by removing manure from the pens.

Fig 2. Types of low cost housing used by small holder producers

3.4 Health

Interviewed pig producers do not vaccinate against any disease and deduction made from interviews has shown that treatment of sick animals is not a priority with most of producers surveyed. Lack of sufficient funds may be a reason. For the control of external parasites such as mange, farmers utilize locally available dips and pour-on’s such as Dazzel and Taktic. With poor waste management and disposal, health problems become acute. Due to high costs of vaccines, producers seldom inoculate or dose their animals. In view of the fact that an outbreak has never been experienced, farmers deem that their animals’ health is not at risk. Producers also believe that resistance has been built against any possible diseases available in the area by the breeding stock. This is one reason that producers select gilts from their own breeding herds. Figure 3 indicates animal condition observed at two different units.
Three of the interviewed producers voiced dissatisfaction about the perceived services that should be provided by the Animal Health programme of the Department of Agriculture. They feel that it should be the state’s responsibility to ensure sound treatment of smallholders’ animals.

3.5 Marketing

Pigs are sold at different ages or sizes and marketing is through a combination of marketing channels such as abattoirs, auctions, commercial farmers, local small farmers or to any other customer that approach the farmer in need of pigs. Sales of pigs do not occur throughout the year but seasonally due to high prices pressed by high demand. In all areas pigs are highly demanded during festive and Easter seasons.

Four interviewed producers slaughter illegally and cut carcasses into smaller cuts which are then informally marketed to fetch higher prices for the carcass. A kilogram pack of mixed portions are sold for R28.00 to R45.00 depending on the area. Unavailability of local slaughtering facilities, high slaughtering fees, transport costs and low prices fetched per kg carcass weight from the abattoirs are the reasons given to justify illegal slaughtering. Distant producers have to travel as far as 90km to access legal slaughtering facilities.

The decision to market is determined by both age and weight of the animals, and in some instances the need for funds and demand. Most producers do not have access to scales to weigh the pigs, and therefore rely on the size and condition of the animals to determine the price.

Sixty percent of the farmers prefer not to market through a contract because of the contract’s binding rules, such as fixed price and constant supply. Forty percent stated that they would prefer to market through a contract because of the secured market guarantee. However, none of the interviewees markets through a contract. Table 2 indicates the different prices received per production stage.

Table 2 indicates the different prices received per production stage.

<table>
<thead>
<tr>
<th>Animal Class</th>
<th>Age</th>
<th>Weight</th>
<th>Price Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weaners</td>
<td>6-8wks</td>
<td></td>
<td>R200.00 – R350.00</td>
</tr>
<tr>
<td>Growers</td>
<td>4 months</td>
<td>30-40kg</td>
<td>R450.00 – R600.00</td>
</tr>
<tr>
<td>Finishers: Gilts</td>
<td>8 months</td>
<td>80kg</td>
<td>R750.00</td>
</tr>
<tr>
<td>Finishers: Barrows</td>
<td>8 months</td>
<td>80kg</td>
<td>R1000.00 – R1200.00</td>
</tr>
<tr>
<td>Meat (Pork)</td>
<td>1 kg</td>
<td></td>
<td>R28.00-R45.00</td>
</tr>
</tbody>
</table>
3.6 Challenges faced by smallholder pig producers:

i. The profitability of every pig farm whether small, medium or large is determined by the number of pigs market per sow per year. Knoesen (1993) indicates that higher profits can therefore be achieved through high litter size born alive, and reared under good management. Lower litter sizes and farrowings per recorded by interviewed farmers put pressure on economic sustainability.

ii. High cost of balanced rations results in producers using available cheaper feed sources that do not always meet the nutritional requirements of the pigs, therefore hampering the production performance of the pigs.

iii. Poor housing structures do not always protect pigs from prevailing temperatures, leading to high piglet mortality and lower growth rates. This limits farmers from breeding during unfavourable seasons.

iv. Unavailability of slaughtering facilities; although farmers are aware of the dangers of slaughtering illegally, they feel they do not have any other option but to slaughter illegally. Farmers therefore take a risk of selling uninspected meat to the public.

v. Unavailability of land for pig farming: at times farmers are forced to down size the number of animals putting a strain on their already strained profit, because they have to share the land with a group of other farmers.

vi. Inability to expand: due to strict regulations and farming within/ near residential areas, farmers face a difficulty of expanding their operations.

3.7 Successful strategies adopted by leading farmers

The enduring production of interviewed smallholder pig producers can be ascribed to their ability to maximise on the availability of cheap feed sources such as fruit and dairy by-products as well as home mixing and rationing, processing of product to ensure higher prices and utilising local markets. System and producer investigation has observed skills of innovation and entrepreneurship and identified these skills as important factors in ensuring adaptability of systems to ensure sustainable production. Eighty percent of producers interviewed also pursue other business opportunities to ensure economic sustainability.

4. EXTENSION/DEVELOPMENT IMPLICATIONS

Factors identified in sustainable small scale operations like cheap housing, sourcing alternative feed sources, exploring market opportunities, identifying innovative and entrepreneurial skills are the criteria to be used in establishment of new funded projects. Establishing new small scale projects based on large scale commercial systems and models may impact on sustainability. Identified sustainable small holder producers may be used as models and extension partners in local pig production development. Decisions on development and suggestions for new systems should be decided with the farmers and not for the farmers.

Productivity and profitability of these farmers can be improved by improvement of the housing structures, with the introduction of farrowing houses to minimise pre-weaning mortality. This will ensure that breeding occurs throughout the year, and therefore increasing the number of pigs sold.

Encouraging and teaching farmers about the importance of record keeping will assist with proper evaluation of their economic development.
Training of farmers on training academies to give an in-depth knowledge of pig production, practical experience and also commercial pig production exposure will be an added advantage.

It is a general phenomenon that resource poor farmers find it challenging to cooperate and work together even though they themselves agree to the benefits. This is limiting farmers’ growth, increasing transaction costs and not creating economies of scale. Value adding is one of the potential business opportunities that could be derived under a form of a cooperative structure. There is a potential for farmers to form a bigger buying or collecting group instead of operating as individuals.

REFERENCES


Back to Table of Contents
COMPARATIVE ADVANTAGE FOR AN ACCEPTABLE ECONOMIC RETURN OF THREE MAIZE GENOTYPES PLANTED BY SMALL SCALE FARMERS AT TSHIKONELO VILLAGE, VHEMBE DISTRICT, LIMPOPO PROVINCE.

Nemutshili, V. ⁶¹, Muthala, K. S. ⁶², & Sikhipha, N. ⁶³

1. INTRODUCTION AND PROBLEM STATEMENT

Maize is the largest grain crop produced in South Africa at around nine million tons per annum with most being used domestically for human food. An informal survey conducted at Tshikonelo by the Limpopo Department of Agriculture (LDA, 2012) revealed that small scale farmers are producing grain maize at a range of 0.3 – 1.2 t ha⁻¹ with an average of 1 t ha⁻¹. With an average annual rainfall of 600mm the study revealed that maize yields at Tshikonelo are less than the expected potential for the area (3 - 4 t ha⁻¹) although a slight decrease in that annual precipitation has been experienced during the past production season. These small holder farmers (1 - 2ha) buy seeds of different genotypes viz. Open Pollinated Varieties (OPV), Conventional (Hybrids), and Yield Guards (GMO’s). These farmers entertain some of the crop management practices required e.g. planting on lines and weed control. Farmers at Tshikonelo make no use of fertilizers or pesticides.

Production cost of maize is high due to labour cost and increase of input costs especially seed and mechanization costs. On the other side, threats by climate change are imposed to the farming community. Reflecting to the observations of the 4th Assessment report of the Intergovernmental Panel on Climate Change (IPCC) published in 2007, it is projected that climate change will impact agriculture and food production around the world. Selection of crop varieties is recommended in order to maintain production under the changing climate.

Genotypic variation in growth and yields of maize has been reported by a number of researchers. For example, Ulger et al (1997) recommended the use of new maize hybrids as first and second crop at the Cukurova region of Turkey. A study conducted by Tolera et al. (1999: 165 – 177) in the tropical zone of Ethiopia on the performance of eight varieties of maize resulted in a drought tolerant variety (OPV) yielding high (6.99 t ha⁻¹) than hybrids compared with. In Nigeria, Ogunbodede (2001) observed the significant varietal difference (p<0.05) between the OPV’s and hybrids where the highest yielding OPV had an average grain yield of 2.43 t ha⁻¹ while the best yellow hybrid yielded 2.82 t ha⁻¹. Significant genotype x location interaction was observed for both sets of maize varieties. This was echoed by Kogbe and Adediran (2003) when they observed hybrid maize yielding higher and using N and P more efficiently than the open pollinated in two trial locations. Nur Eldein (2006) found no significant difference between Hudeiba-1 and Hudeiba-2 but the two over yielded other varieties viz. Mogtamaa-45 and Var. 113 by 17.5% and 13.6%, respectively in Sudan. They were best performers in most characters like cob weight, cob length, and 1000-grain weight. Mugisha et al (2010) revealed the significance difference of mean yields from improved maize varieties (2941.5kg/ha per season) and that from local varieties (1694. kg/ha per season) in Uganda. Farm yields were seen to have improved. Intensity of adoption of improved maize varieties increased farm yields. Extension advisory services were strongly associated with the adoption of improved varieties.

⁶¹ Limpopo Department of Agriculture, P/Bag X2247, Sibasa, 0970. Tel: +2715 963 2005/6/7. Fax: +27159 963 1414. Email nemutshiliv@agric.limpopo.gov.za
⁶² Limpopo Department of Agriculture, P/Bag X2247, Sibasa, 0970. Tel: +2715 963 2005/6/7. Fax: +27159 963 1414. Email muthalaks@gmail.com
⁶³ Limpopo Department of Agriculture, P/Bag X2247, Sibasa, 0970. Tel: +2715 963 2005/6/7. Fax: +27159 963 1414. Email sikhipham@gmail.com
WOLF et al. (2010) used a simulation model, WOFOST, to calculate the grain maize yield in the main arable areas of the European Community (E.C.) using historical weather data and average soil characteristics recommended the use of varieties with an early start of grain filling and early sowing. Work done by Geleti et al (2011) in Ethiopia revealed the difference in yield between three maize varieties which was significant (P<0.01). Work done at Bagauda in Nigeria by Wailare (2012) on eight varieties comprised of local varieties (OPV’s) and improved varieties (Conventional var.) revealed improved varieties outperforming the local varieties in yield. Of the eight varieties, SAMMAZ 18 performed significantly better and was followed by the local variety H.H. Three hybrid maize varieties were evaluated in Teaching and Research Farm of Delta State University, Asaba Campus for grain yield under three different plants spacing for such growth characters as plant height, number of leaves, leaf area and stem girth (Enujeke, 2013). It was found that hybrid variety 9022-13 out yielded others and that it possessed bigger stem girth and leaf area. Recently, Khan (2013) observed inconsistence of relative performance of genotypes over environments in Sudan.

As mentioned earlier, one of the IPCC’s recommendations talks to the selection of crop varieties. These prompted the authors to assess/evaluate the performance of different varieties used by farmers at Tshikonelo in order to recommend the best ones which if adopted will give rise to maize grain yield thereby according our small scale farmers an acceptable economic return. An on-farm demonstration trial was laid at Tshikonelo village where three different genotypes were assessed for yield performance. The trial maintained the plant population practiced by farmers. All crop management activities practiced by farmers were observed and maintained. Genotypes under test were (i) Open pollinated varieties (OPV’s) wherein variety AFRIC 1 and variety ZM 1523 were used, (ii) Conventional variety (hybrid) wherein variety SNK 2147 was used, and (iii) YieldGard varieties (GMO’s) wherein cultivars P2653WB and P2823WB were used. Varieties selected/used were those which farmers were planting at that time.

2. MATERIALS AND METHOD

2.1. Land preparation

Land preparation, mainly ploughing, at Tshikonelo community maize growing fields was done by the Fetsatlala hired tractors. With no disking of clods taking place, farmers had no choice but to plant their maize crop on the ridge made by a plough. For this work, a trial layout was drawn.

2.2. Trial layout

A trial composed of two replicas was planted at Tshikonelo during the 2013/14 summer season. Each replica had five (5) plots wherein five (5) cultivars were randomly planted. Each plot had six (6) rows of six (6) meters in length and the rows were one meter apart. Plots within a rep were situated one (1) meter apart. Reps were situated two (2) meters apart. Cultivars were selected randomly by a farmer who picked papers rolled to a round shape from a 2 liter plastic container. The rolled papers had names of cultivars written in them. Each time a farmer picked a paper, the name of a cultivar written on it was automatically attached to a plot in sequential order within a rep.

2.3. Planting

Planting hills were prepared by using a hand hoe. Hills were thirty (30) centimeters apart within the row giving rise to twenty hills per row. Two seeds were planted in each hill. A planting density of twenty (20) plants per row was maintained through thinning of plants at V2 stage.
2.4. Crop management practices

The farmer did the weeding but was advised to complete the activity within a day. Neither pesticide nor fungicide was applied during the growing season. No topdressing was done since the activity is not practiced in that area.

2.5 Harvesting

Harvesting was done manually. Only middle four (4) rows (24 m²) per plot were harvested. Plants in those four rows were counted. Ears were removed from the stalks, counted, weighed, and threshed. Fresh grains were weighed and moisture percentage was tested. Grains were sun dried and weighed per plot at/below 12.5% moisture content. The farmer was given the border rows to harvest for herself.

2.5. Data collection

The researchers/authors collected the data. Data collected was on stand count at V₂, stand count at harvest, number of plants lodged at harvest, number of ears, field weight, grain weight at harvest, moisture % at harvest, and dry grain weight.

3. RESULTS AND DISCUSSION

Figure 1: The performance of cultivars under test with regards to 4 main variables at harvest

Figure 1 above shows the performance of each cultivar in respect of the four (4) main variables of the trial measured at harvest viz. stand count, number of ears, field weight of ears, and the dry grain weight. An open pollinated variety AFRIC 1 has shown the highest number of plants followed by YieldGard cultivars P2653WB and P2823WB respectively. Hybrid SNK 2147 has shown to have a least number of plants. Of all the varieties, P2653WB was selected by farmers during harvesting as one possessing the exceptional standability followed by SNK 2147.
Although YieldGard cultivar P2653WB produced the highest number of ears, Hybrid variety SNK 2147 produced bigger attractive ears. This is attributed to the low density SNK 2147 possessed which leads to less competition of nutrients, moisture and sunlight amongst the plants.

Cultivar P2653WB had more number of ears as compared to its counter part (P2823WB) from the same genotype. It also possessed the highest number of ears as compared to all cultivars under study. It was succeeded by cultivar SNK 2147. Cultivar SNK 2147 possessed more field weight than its competitors. This was attributed to low competition for nutrients, moisture, and sunlight experienced by its plants within the plots which resulted in better ear development and grain filling. SNK 2147 had medium to large ears as compared to those of P2653WB which ranged from small to large. Amongst the OPV’s, cultivar AFRIC 1 produced more ears of less field weight as compared to ZM 1523 which produced less ears of more weight. The more the plants AFRIC 1 possessed in the plots, the higher the competition of nutrients, moisture, and sunlight it was subjected to. Some of its plants beard barren cobs.

Fig 2: Number of ears vs field weight of each cultivar in study
Figure 3 above shows SNK 2147 leading its competitors in both Field weight and Grain Dry weight followed by P2653WB. P2823WB obtained the third position. The open pollinated varieties viz. ZM 1523 and AFRIC 1 have shown lagging behind respectively.

Figure 4 shows a Conventional genotype variety - SNK 2147- over yielding its competitors under study. It was followed by the YieldGard genotype varieties – P2653WB and P2823WB respectively. The OPV genotype varieties – ZM 1523 and AFRIC 1 – were the least performers. The average yield of the study was 1108 kg.ha$^{-1}$ and only SNK 2147 and P2653WB performed above average.
3. CONCLUSION

The study revealed that genotypic variation exists amongst different cultivars. The study observed a difference in the performance of varieties within the same genotypic group. Although variety SNK 2147 out yielded variety P2653WB in the study, it is too early to come up with a solid recommendation. The performance of SNK 2147 was attributed to the low population density it was raised on. It is very early to rule out an OPV genotype due to its least yielding varieties since AFRIC 1 has shown to possess the highest number of plants at harvest. Its yield might have been sacrificed by the competition for nutrients, moisture, or sunlight amongst the plants within the plots. A thorough check needs to be done wherein a scientific study evaluating cultivar performance in maize grain yield, level of inputs viz. fertilizers and population densities, and their interactions has to be put in place for one to come up with a valid recommendation which if adopted by small scale farmers at Tshikonelo may bring a positive economic return.

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IMPROVED BEEF PRODUCTION IN COW/CALF REARING SYSTEMS (MULTIPLE CALVES): OPPORTUNITIES FOR SMALL SCALE PRODUCERS IN EDEN DISTRICT.

Grobler, H. J. F. 64.

Key words: Cow/calf, multiple calves, calf rear systems, beef-dairy cross calves, monitoring, hands on skills development, research, demonstration, farmer participation extension approach.

1. INTRODUCTION

A substantial number of small scale beef producers in the Eden district buy in young (day to week old) dairy calves to rear on lactating dairy type cows. Multiple calves are thus reared per lactating cow per lactating cycle. The purpose is an attempt to increase production and income from limited available resources. Grown-out dairy calves (from weaning) are sold to agents buying up stockers for beef feedlot operations or at local auctions. Due to the lower growth potential and lack of carcass conformation of finished dairy animals, farmers have to accept reduced marketing prices for these calves.

An opportunity for these farmers opened up when the Research, Technology & Development Services - Program (RTDS); Institute for Animal Sciences; Outeniqua Research Farm of the Department of Agriculture, Western Cape (WCDoA); in an attempt to minimise the number of Jersey dairy heifers reared, decided to inseminate cows of lesser genetic merit, with beef bull semen. This action was taken due as day old beef cross calves are more easily marketed and receive higher prices.

The Farmer Support and Development Programme (FSD) in the Eden district identified this practice as an economic opportunity for small scale calf rearers. Outeniqua cross calves made available to small scale calf rearers could improve their economic position substantially.

The purpose of this paper is to communicate the success from seizing this risen opportunity in improving the sustainability of small scale farmers in the Eden district by opening up access to the cross calf resource and presenting the results from biological, economical and extension monitoring and evaluation actions.

- describing current multiple calf/cow rearing systems practiced,
- incorporating farmers in the project,
- presenting measured growth and economy of dairy to beef cross calves in these systems,
- to disseminate the advantages of calf breed to small scale calf rearers in the Eden district and,
- to propagate the success of the project by incorporating farmers in groups and linking them with the broader agriculture industry.

2. METHODOLOGY

A pilot study by FSD, Eden in cooperation with RTDS (Outeniqua Research Farm), Western Cape DoA, was initiated in 2011 to make beef cross calves available to small scale calf rearers in the Eden district as a pilot study to investigate growth, marketability and economy of the system.

64 Western Cape Government: Dept. of Agriculture, Farmer Support and Development, Extension and Advisory Services, P O Box 249, George, 6530. Tel Nr: +27 44 8033711. Fax Nr: +27 44 8033709. Email: manieg@elsenburg.com
The Farmer Support and Development Programme in Eden district, through the ward officers are responsible for identifying calf rearing producers in the district. Producers are visited, evaluated and selected into the pilot project by a screening committee using an eleven point criteria list.

Farmers selected through the scoring process are notified by letter and sign a Memorandum of Understanding with the Department to establish a formal, professional relationship. Calves are then made available for purchase at the Outeniqua Research Farm through a formal request. A quarterly monitoring program is followed where the following detail is recorded:

- Cow & calf identification,
- Pasture base and feed base utilised,
- Cow and calf weights recorded, number of calves suckling and pregnancy determination done,
- Health management and treatments recorded,
- Faeces sampling,
- Marketing price and weight per calf achieved,

The economy of each project and system is analysed in collaboration with NMMU (Agricultural Management, Saasveld Campus) and annual feedback given to the participants, with achievements acknowledged.

Pilot participants are included into a Calf rear interest group convening at least twice per year.

3. RESULTS

From the start of the project a total of 248 calves (up to 1April 2014) have been distributed to 18 smallholder calf rearers in the Eden District (91, 123 and 34 for 2012, 2013 and 2014 respectively). Biological monitoring has been conducted at nine selected projects. Economic analysis of five projects has been done for the 2011/12 and 2012/13 production seasons.

Calf rear production systems range from semi extensive (two calves per cow lactation of 6 to 8 months) to intensive (8 to 12 calves reared per cow lactation), depending on the intensity of pasture production base used. Some hand rearers are also included in the project. A comparison of production within each system is presented in figure 1. In more intensive systems calves are weaned at three to four months and replaced by a new batch of calves. Monitoring shows that calf growth declines after weaning, indicating farmer and Advisory attention needed to feed resources used during this period.
Fig 1. Eden Calf rear systems with comparative growth of calves within each system.

Economic data according to actual prices received at auction for a specific project (Table 1) indicate substantial advantage of using beef crossbred calves compared to dairy breeds. The lower process for 2013 was a result of the impact of drought conditions over large parts of Southern Africa. The flooding of the market with beef animals, to relieve impact on pasture and veldt, impacted negatively on the prices offered for beef animals and severely on beef/dairy crosses and dairy calves offered. Prices may normalise when sufficient rains has fallen in the region.

Table 1. Actual Live weight prices received for diferent calf breeds at auction (Oudtshoorn) in 2012, with extrapolation for 2013 using December 2013 prices (same owner).

<table>
<thead>
<tr>
<th>Steer Breed</th>
<th>Weight at sale kg</th>
<th>Price received 2012</th>
<th>R/kg 2012</th>
<th>Difference in R/kg received</th>
<th>Price for 220 kg steer @ real prices</th>
<th>Prices in R/kg Dec13</th>
<th>Prices in Dec13 for a 220kg steer</th>
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<tr>
<td>Hereford X Dairy</td>
<td>110</td>
<td>R 1 820.00</td>
<td>R 16.55</td>
<td>R 0.00</td>
<td>R 3 640.00</td>
<td>R 12.50</td>
<td>R 2 750.00</td>
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<tr>
<td>Angus X Jersey</td>
<td>274</td>
<td>R 4 400.00</td>
<td>R 16.06</td>
<td>-R 0.49</td>
<td>R 3 532.85</td>
<td>R 11.00</td>
<td>R 2 420.00</td>
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<tr>
<td>Friesian</td>
<td>255</td>
<td>R 3 100.00</td>
<td>R 12.16</td>
<td>-R 4.39</td>
<td>R 2 674.51</td>
<td>R 12.00</td>
<td>R 2 640.00</td>
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<tr>
<td>Jersey</td>
<td>177</td>
<td>R 1 530.00</td>
<td>R 8.64</td>
<td>-R 7.90</td>
<td>R 1 901.69</td>
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<td>R 1 760.00</td>
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<td>Jersey</td>
<td>160</td>
<td>R 1 580.00</td>
<td>R 9.88</td>
<td>-R 6.67</td>
<td>R 2 172.50</td>
<td>R 8.00</td>
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Project economic analyses, as undertaken in cooperation with NMMU (Saasveld Campus, Agricultural Management) reveal gross margins ranging from R 1 839.00 to R 2 300.00 per calf realised (Jordaan 2012; Jordaan 2013). Economic results expressed in margin per calf sold for four projects are presented in Figure 2. Margins realised show that good economic benefits may be obtained with calf rearing, regardless of the system used, but depending on good management practices.
Fig 2. Economic comparisons for four Eden Calf rear projects for 2012/13 expressed in margin per calf sold.

The monitoring and evaluation schedule implemented forms part of a comprehensive support system including group events where farmers receive feedback on general and project specific assessments, training on limitations identified, networking opportunities with fellow farmers and the industry as well as exposure to research and new technologies. The need for researching cow/Calf rearing systems has been identified resulting in a research project being started at the Outeniqua Research Farm. This research will serve to perfect calf rear models and also serve as a demonstration unit and commodity group focal point.

4. CONCLUSIONS AND EXTENSION IMPLICATIONS

The results achieved during execution of the calf rearing pilot project indicate a real advantage to small holder beef farmers in sourcing beef-dairy cross calves for improving the economy of their rearing systems. Expansion of the model is encouraged where access to beef type calves is within reach. Scientific verification of production potential and refinement of systems in the Southern Cape needs to be researched (in process). Linkages for small holder farmers with commercial dairy operations, inseminating cows with beef bull semen needs to be established. Using the project data (actual farmer progress) and the research project as demonstration generate a strong extension tool which keep farmers involved, ensures group participation and reap immediate production and/or economic results.

The extension approach followed based on working with identified farmers (pilot project) on practical recording, monitoring and evaluation build hands-on skills for project sustainability. These actions are implemented within the context of the total commodity where training, group work, participatory competitions, -research and demonstrations involves the farmer as partner in development and equips him as an extension agent to fellow producers.
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Acknowledgement
Calf Rea Pilot Project team, Eden District, WCDoA

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LEARNING TO DO, DOING TO LIVE AND LIVING TO SERVE: A CASE OF DEVELOPING AN INTEGRATED VEGETABLE PRODUCTION SYSTEM IN KWAZULU-NATAL.


ABSTRACT

Broadly speaking, integrated farming or integrated production refers to a polyculture system of farming as compared to commonly used monoculture. In a system where sustainable agriculture is the focus and food security is the goal, it is imperative that an integrated approach is favoured. That way, a combination of advances in agricultural science and local or indigenous knowledge can be used. The objective of this paper was to investigate the effectiveness of combining agricultural science with traditional knowledge principles in learning about sustainable vegetable agriculture production for food security and small-scale economic development. Four KwaZulu-Natal sites located at Richards Bay (north coast), Umbumbulu (south coast), Mphophomeni (midlands) and Swayimani (north coast-interior) were selected for firstly a preliminary survey to determine traditional knowledge about vegetable production. Then, field trials were conducted with a reduced number of participants representing an average household to grow popular vegetables identified in the surveys with the aim of testing the hypothesis of year-round organic production under virtual dryland conditions. Performance of field trials was determined by crop yield and capacity of a 1000 m² land area to contribute to household food security and economy. The survey allowed for identification of the level of local knowledge and determination of crop production requirements at different sites. This further allowed advisors to learn from communities about critical issues for exploration in designing appropriate production plans for sustainable vegetable production. It is concluded that science and traditional knowledge are both required in working towards sustainable small-scale farming. There is also a great advantage in learning together with the communities before and during an intervention for rural development in that a top-down approach is avoided and future strategies for appropriate production plans can be developed with confidence.

Key words: vegetable production, food security, production plan, situation analysis

1. INTRODUCTION

Studies conducted in a number of years have shown that agriculture is a major contributor to overall economic development in developing countries, especially the lowest-income ones (International Food Policy Research Institute, 1995). Agriculture has also been shown to have a stronger effect on poverty reduction than do other sectors of the economy, because it offers possibilities for reducing risks of food shortages at all levels of society, increasing overall supply of food, creating economic opportunities for vulnerable people and improving dietary diversity and the quality of food consumed by farm households (Hendriks & Lynne, 2009). However the responses of the agricultural sector to the marginalised rural communities are often conceived of outside the community context and neglect the local resource base, both natural and cultural (Gari, 2004). The majority of the rural populations in southern Africa remain trapped in poverty and social exclusion, while policies and

65 School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Private Bag X01, Scottsville 3201E-mail: modiat@ukzn.ac.za
66 School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Private Bag X01, Scottsville 3201.
67 School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Private Bag X01, Scottsville 3201.
investments tend to focus on urban areas, industrial endeavours and agribusiness development. It is estimated that about millions of small farmers worldwide live in marginal environments and lack policy and technical support for their indigenous farming systems (Altieri, 2002:10). Increased attention should be given to the potential of indigenous knowledge and agro-biodiversity in these communities to combat agricultural constraints and enhance sustainable livelihoods (Gari, 2004).

Many circumstances that influence the decisions a farmer chooses are linked to personal experience that has developed over a life time, and even longer, including inherited traditional knowledge (Denison & Manona, 2007). However, research into rural development generally ignores traditional knowledge and focusses on transferring packaged methodologies that emerged as successes in the developed world. Consequently, projects are introduced with great success in the early stages, but they collapse soon after the artificial support is removed by the funders or government extension support (Chambers, 1993). It is for this reason that participatory research approaches are necessary to investigate issues of concern to resource-poor communities, and to plan, implement and evaluate rural development strategies jointly between scientists and rural communities (Leeuwis, 2000:932; Wiggins et al., 2010:1341). Rapid rural appraisal emerged as a result of dissatisfaction with time consuming surveys as means of gathering information for solving policy-related issues in rural communities. There was also dissatisfaction with superficial visits to rural areas by policy makers and funders, which Chambers (1993) termed “rural development tourism”. The approach focussed on improving interview techniques by using key informants and semi-structured interviews with checklists and triangulating. It also promoted a spirit of open, cooperative enquiry in exchanging information on new techniques experimented with (Wiggins et al., 2010).

Food insecurity is a global challenge affecting over 1 billion people to the extent of poverty and hunger. Campbell (1991:410) stated, “Risk factors for food insecurity include any factors that affect household resources and the proportion of those resources available for food acquisition. Potential consequences of food insecurity include hunger, malnutrition and (either directly or indirectly) negative effects on health and quality of life. The precise relationships between food insecurity and its risk factors and potential consequences need much more research now that there is an emerging consensus on the definition and measurement of food insecurity. Indicators of food security or insecurity are proposed as a necessary component of the core measures of the nutritional state of individuals, communities or nations”. Despite that this statement is as true now as it was two decades ago, the approaches to address food production by poor communities have not reached the level of research suggested by Campbell (1991). A working model for rural development has got to be one that relies on both agricultural science and indigenous or traditional knowledge. The potential influence of such a model on a policy to address the new challenge of food insecurity is profound. Evidence of this can be cited in early studies about the origins of agriculture: “The inventors of agriculture had previously acquired special skills in other directions that predisposed them to agricultural experiments”, stated (Harlan, 1975).

The objective of this study was to investigate the effectiveness of combining agricultural science with traditional knowledge principles in learning about sustainable vegetable agriculture production for food security and small-scale economic development in selected locations of KwaZulu-Natal. It was hypothesized that learning together with subsistence farmers can create an opportunity for those who seek to uplift them to implement sustainable strategies together with the beneficiaries. That way, the ownership of strategies will reside with the beneficiaries.
2. MATERIALS AND METHODS

2.1 Study sites

Four sites located in the three major regions of KwaZulu-Natal (Figure 1) were selected, namely, Richards Bay, Umbumbulu (25 km north of Amanzimtoti), Mpophomeni (near Howick) and Swayimani (near Wartburg). All the sites were tribal lands with community gardens. The premise of the study was that subsistence farmers have a goal to produce vegetables throughout the year to meet household food security and small-scale farming needs. This goal was presumably impeded by lack of skills and the inappropriate monoculture system.

2.2 Situation analysis

At each site, a workshop was organised to allow farmers from many community gardens to participate. The specific objective of the workshop was to introduce the farmers to the concept of participatory identification and analysis of constraints, innovative ways of producing vegetables, and sustainable community agriculture. Participatory identification and analysis of constraints was undertaken using a structured questionnaire according to Modi (2012:159). The following aspects of sustainable agriculture were explored in the situation analysis: (i) The need to satisfy human food security, (ii) Balance between productivity and natural resource protection, (iii) Economic viability of agricultural activities and (iv) Enhancement of social livelihoods. However, the results of this study focussed on (i) and (iii), with inferences to (ii) and (iv).

A total of 454 members of communities, each representing a household participated. These were from Richards Bay (366 people from 22 locations), Umbumbulu (40 people from one location), Mpophomeni (31 people from one location) and Swayimani (17 people from one location) (Figure 1).
2.3 Crop production trials

At each location 1000 m$^2$ of land was allocated to five individuals to conduct field trials on conventional vegetables (cabbage, Swiss chard and green pepper), maize green mealies (cultivar SC701), dry beans (cultivar Ukulinga), sweet potatoes (variety A45), taro (local landrace) and potatoes (cultivar Mnandi), all selected on the basis of the situation analysis (Table 1) and agreement between the advisors and the communities. Input costs were in terms of seed and seedlings (R3000/annum/site) and labour (R24000/annum/site). Water was harvested from the nearby stream and its cost was not factored. Crop production, all year round, was based on a production plan derived from the situation analysis (Table 1).
Table 1. Annual production plan. Note: V = vegetables (cabbage, Swiss chard and green pepper) in 10 m² plots of intercropping with maize (M), sweet potatoes (S), taro (T) and potatoes (P). The plots were also rotated randomly.

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2.4 Data analysis

GenStat (Version 14, VSN, UK) was used to perform analysis of variance and to generate least significant differences to determine differences between means (P ≤ 0.05).

3. RESULTS AND DISCUSSION

3.1 Crop selection

The situation analysis revealed that the popular crops grown at the four sites are those shown in Figure 2. In addition, the farmers variously indicated the use of indigenous (wild) vegetables such as amaranth and black jack (data not shown). Although cabbage was a commonly cultivated crop across sites, there were significant (P < 0.05) differences between sites with respect to crop cultivation. Richards Bay was characterised by more uniform crop variability, while the variability at Mpophomeni was least uniform due to low production of maize, beans, taro and sweet potatoes (Figure 2).

The situation analysis also showed that there was a significant difference (P < 0.05) between crops (Figure 3) and sites (Figure 4) with respect to utilisation for home consumption and local market. On average the farmers used their crops mainly for home consumption (~76%) compared to local market (~24%) (Figures 3 and 4). Although it is a traditional crop, taro dominates the crops with a local market together with cabbage. At Mpophomeni and Umbumbulu, crops were grown mainly for home consumption while the level of local marketing was relatively high at Richards Bay and Mpophomeni (Figure 4), likely due to the influence of peri-urbanisation at these sites.

The popularity of the vegetables shown in Figure 2 was confirmed in previous studies on the production of fruits and vegetables in South Africa (Portocarrero, 2010:1). All these except for spinach and green pepper were shown in the study by Portocarrero (2010:1) to directly contribute to the 2 295 000 tons of South African vegetable production in 2009. Swiss chard and green pepper
may have been part of the “other” vegetables contributing 389,000 tons of the 2,295,000 tons (Portocarrero, 2010:1).

Figure 2. Popular cultivated crops at the study sites Richards Bay, Umbumbulu, Swayimani and Mpophomeni as revealed by the situation analysis.

These results show that in this study, the farmers and advisors selected fresh produce crops that already play a role in the South African agricultural economy. When one looks at the regular fresh vegetable markets in South Africa, it is not surprising that the farmers at the study sites had a tendency to consume the majority of their produce. For example, according to Portocarrero (2010:31) Pick ’n Pay, with a fruit and vegetable market share of ~34% has a large buying power, which it uses to forge agreements with producers to ensure that it has fresh produce all year round. It caters for Living Standard Measure (LSM) 4 to 10 and competes on price and shopping experience. Shoprite Holdings Ltd, with a market share of ~32%, targets middle to lower end as well as LSM 8 to 10 consumers. It has a practice of visiting farms to ensure adherence to standards. In recent years, these markets have moved into the peri-urban and rural areas. That the subsistence farmers in the present study showed a tendency to produce the popular vegetables for both home consumption and local market suggests that there is a potential for sustainable agriculture at the study sites. The impact of this was tested through crop production field trials.

3.2 Crop field trials

Agronomic research has shown that it is easy to produce maize (Marais, 1998:1). The results shown in Figure 5 confirm this fact about green mealies. However, cabbage is known for sensitivity to pests and diseases and high demand for water, especially in summer (Smith, 2006:342). Hence, it was a surprise to see that at all sites (Figure 5), cabbage yield was within average for KwaZulu-Natal (Smith, 2006:343). Green pepper and Swiss chard were also found to be within average, in terms of expected production for the province (Smith, 2006, 354; 357), but the other crops produced below average, except for taro at Umbumbulu (Figure 5). The reason for the best taro performance at Umbumbulu was associated with the many years of experience of these farmers producing organic taro under the mentorship of the main author, initially for Pick ’n Pay and Woolworths.
It was very encouraging to analyse the economic and food security impact of the field trials (Figure 6). Although there was a significant (P < 0.05) difference between sites, all community gardens had a positive organic crop production during the year under study. The higher yields, and associated gross income at Richards Bay and Umbumbulu are due to favourable environmental conditions for crop production in Bioresource Group 1 here, compared with interior located Swayimani and Mpophomeni, where temperatures in winter may be too low for good crop performance all year round and too high in summer (Smith, 2006:24). Although at all sites, farmers were advised to fertilise the crops according to soil analysis results (not shown), the virtually dryland system differed from one site to another and may have affected crop yield. It is notable that at three of the four sites studied, farmers harvested indigenous wild vegetables, which have been shown to have good nutrition (Guarino, 1997:76). The contribution of these vegetables to food security requires further investigation.
Figure 5. Average crop yield at different sites over one year of intercropping and rotation.

Figure 6. Comparison of different sites for the impact of the production plan using 1000 m² on food security and economy of a five-member household.

4. CONCLUSIONS

This was a preliminary study on organic production of popular vegetables selected on the basis of a structured questionnaire used for a broad based situation analysis at sites that are located far from each other in KwaZulu-Natal. Although the situation analysis identified other crops, there was an agreement between farmers and advisors to experiment on the selected ones to determine the potential for food security and economic production. The study revealed clearly that for a household of five persons, an average fresh vegetable crop yield of 19 to 27 t/ha can be produced per annum if production occurs all year round. Of this amount, 12 to 22 t/ha can contribute directly to food security, and an income of R6000 to 15000 can be derived under conditions traditional farming in tribal rural areas. It is argued that, there is a significant amount of underutilised land in the tribal rural areas of South Africa, which can be used productively according to this model of combining the
knowledge of the farmers and agricultural science. This model could reduce the cost of food for the majority of poor people, while it improves food security, and enhancing nutrition. This model needs to be duplicated for individual households, outside community gardens, because food prices are increasing rapidly due to population growth, price of energy and demands for processing of other products from crops (Brandt, 2012).

REFERENCES


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EFFECT OF SOIL ACIDITY ON NUTRITIONAL QUALITY (PROTEIN AND OIL) OF GROUNDNUT (Arachis hypogea, L) SEEDS

N. H. Shezi
Department of agriculture and Environmental Affairs, Private Bag X5002 Hlabisa, 3937

INTRODUCTION
Groundnuts (Arachis hypogea, L) are grown for their nutritious seeds, with 25% to 32% protein and 42% to 52% oil content. Their rich nutritional content serves rural communities in the fight against malnutrition. As part of a broader study on tolerance to soil acidity, the response of groundnut seed quality to acid soil was examined. The aim of the study was to determine whether genotypes deemed as tolerant to acidity would maintain the desired quality in terms of protein and oil content when grown at high acid saturation.

Materials and Methods
Three groundnut genotypes, Hart, Kwarts and Rambo, were grown in pots in a greenhouse at the University of KwaZulu-Natal using the Inanda soil form with a high acid saturation of about 80%. Exchangeable acidity of 2.88 cmol/L and pH of 3.95. Treatments were arranged in a completely randomised design with two factors: cultivars (Hart, Kwarts and Rambo) and lime (calcium carbonate, dolomite and no lime) with 3 replicates. Seeds were harvested at maturity and analysed for protein and oil contents. Total protein from groundnut seeds was extracted according to the modified method of Zhang et al. (2005). Protein concentration was determined using bovine albumin (BSA) as standard (Bradford, 1976). Lipid concentration was determined according to Meyer and Terry (2008). The recovered oil was weighed and percentage oil calculated (% w/w).

Discussion & Conclusion
For all cultivars, protein content increased significantly (P<0.001) in response to high soil acid saturation (Figure 3). Although groundnuts have high protein content, the observed increase in protein under low soil pH may be attributed to soil acidity stress. The cultivars Rambo, Kwarts and Hart grown were selected as soil acid Tolerant, moderate tolerant and susceptible in previous study, accumulation of protein under stress has been correlated with stress tolerance. The concentration has been shown to be high in stress tolerant than sensitive plants resistant of cultivars. In response to soil acidity plant make new protein to help them grow and develop under stress conditions (Goudarzi and Pakniyat, 2009). The increase in protein of Rambo and Kwarts emphasis the findings suggesting that this cultivars are tolerant to soil acidity. Low soil acidity reduce oil content in all cultivars (Figure 4). Soil acidity significantly affects nutritional quality of groundnuts as measured by oil and protein content.

REFERENCES
1. Introduction

Bridging the knowledge gap is key in rural development and in ensuring the success in extension programmes.

- One-on-one extension remains the preferred method of knowledge transfer.
- However, various challenges within the sugarcane industry exist:
  - Wide geographical areas and high grower numbers.
  - Knowledge gaps.
  - Limited resources of extension staff providing extension support (Fig 1).
  - Limited resources for small-scale growers (SSGs) e.g. land, labour, equipment, finance.
  - Lack of sugarcane specialisation in the KwaZulu-Natal Department of Agriculture and Environmental Affairs (KZN DAEA).

2. EVA Extension Approach

- A formal extension partnership exists between South African Sugarcane Research Institute (SASRI) and the KZN DAEA → Extension Venture Agreement (EVA).
- Knowledge gaps of SSGs identified through SASRI Research, Development & Extension (RODAE) process and personal contact.
- Co-ordinated planning and extension approach i.e. Jointly developed Programme of Work (PoW) through EVA.
- Up-skilling of KZN DAEA extension staff → Annual EVA training programme co-ordinated by SASRI (Fig 2).
- Implementation of KZN DAEA extension staff PoW with SASRI support.

3. SSG Annual Modular courses

- Knowledge transfer method for group learning.
- Conducted per mill area.
- Joint effort between SASRI and KZN DAEA.
- Topics selected as per knowledge transfer needs identified.

4. Knowledge transfer in 2013

- Topics covered at the 2013 SSG Annual Modular courses were:
  - Soil conservation
  - Co-operative farming
  - Fire Awareness
  - CARA
- Relevant stakeholder involved: i.e. SASRI, KZN DAEA, DAFF. Working on Fins. Sugar Miller Companies.
- 10 Modular courses were planned and held with attendance of 449 SSGs.

4. Knowledge transfer in 2013

- Knowledge transfer tools developed by SASRI and handed to growers
  - Technically sound content developed by SASRI, translated into isiZulu and given to KZN DAEA extension staff.
  - Presentations conducted by KZN DAEA extension.
  - Additional knowledge transfer tools identified, developed and distributed e.g. IngeDe publication, Info Pack cd, Information sheet (Fig 3).

5. Conclusion

- Grower acceptance of Modular courses and increased awareness.
- Up-skilling of KZN DAEA extension and increased confidence levels.
- Teams-building and cross-regional support by EVA extension team.
- Questions and discussion that takes place prompts further knowledge transfer requirements for the following year → PoW for 2014.

5. Conclusion

- KZN DAEA can cascade the content developed to smaller groups in their local areas.
- Immense support gained from KZN DAEA Management.
Addressing the challenges experienced by small scale layer units in the Eden District of the Western Cape.

Terblanche, I

*Directorate: Farmer Support and Development, Western Cape Department of Agriculture, ian@ewebburg.com

Background
The Department of Agriculture in the Western Cape supported the establishment of small layer units in rural towns in the Eden district. The aim was to set up economically viable units by way of direct marketing to consumers and providing a more fresh product than the competition from outside at a competitive price. Layer units were established in four rural towns in the Eden district. The unit size capacities ranged from 300 to 1,600 hens, housed in intensive battery systems. All projects were trained in and issued with proper record keeping systems focusing on production and feed consumption. The production and economy of the units were monitored and evaluated by extension officials.

Results
Production and economic analyses uncovered poor economic performance with most of the units. Two units closed down due to economic pressures. The main contributing factors were high feed and pellet costs, confirming the dilemma of smaller units when applying current commercial production systems. This necessitates economy of scale to ensure economic sustainability.

Way forward
To ensure sustainability of small scale layer farmers the following interventions need to be investigated, implemented and evaluated:

- Registering for VAT will lower the feed cost and other production inputs with a resulting increase in profitability. Eggs is a VAT free product. A financial turnover of R40 000:00 is required by SARS to apply for voluntary VAT registration. Expanding the business to comply to minimum turnover requirement for VAT registration purposes.
- Developing the businesses to supply a broader market.
- Diversifying to free-range egg production. A product that can obtain higher prices in specific market segments.
Determinants of Livestock Farmers' Perception of Climate Change and Related Drought Events

M. Rakgasea and D. Norrisb

aUniversity of the Free State, South Africa
bUniversity of Limpopo, South Africa

Introduction

The study was conducted in 10 provinces in South Africa. The objectives were to assess livestock farmers' perception of climate change as a cause of drought, their preparedness for drought and the factors influencing their preparedness. The study used a survey design and data collected from 358 farmers. The results showed that climate change is perceived as a cause of drought by 72% of the farmers. Farmers who had experienced drought were more likely to perceive climate change as a cause of drought. Farmers who had access to information about climate change were more prepared for drought. The study also identified factors such as education, access to information, and government support that influence farmers' preparedness for drought.

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<thead>
<tr>
<th>Do you plan for drought?</th>
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<td>Yes</td>
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<tr>
<td>No</td>
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<tr>
<td>Not sure</td>
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Table 1: Socioeconomic characteristics influencing farmers' preparedness for drought

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<th>Factor</th>
<th>Percentage</th>
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<tr>
<td>Education</td>
<td>35%</td>
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<tr>
<td>Access to information</td>
<td>25%</td>
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<tr>
<td>Government support</td>
<td>15%</td>
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Results and Discussion

Is drought a problem? (Ordinary, Severe, Critical)

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<th>Severity</th>
<th>Farmers who perceive climate change as a cause of drought</th>
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<td>Ordinary</td>
<td>60%</td>
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<td>Severe</td>
<td>75%</td>
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<td>Critical</td>
<td>85%</td>
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<th>Do you see drought as a major problem in the future?</th>
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<td>No</td>
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<td>Not sure</td>
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Table 2: Relationship between farmers' perception of climate change as a cause of drought and their preparedness for drought

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<th>Perception of Climate Change as a Cause of Drought</th>
<th>Preparedness for Drought</th>
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<td>Yes</td>
<td>70%</td>
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<tr>
<td>No</td>
<td>30%</td>
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Conclusion:

The study highlights the importance of addressing climate change and related drought events. Farmers' preparedness for drought can be improved by increasing their access to information about climate change and government support. Education and training programs can also help farmers better understand the impacts of climate change and prepare for drought events.

References:

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EXTENSION SUITE ONLINE
THE IMPORTANCE AS A DECISION SUPPORT TOOL
Matsuzkie Mvelase and Janine-Louise Bekker | Mantis Agricultural Intelligence Solutions (Pty) Ltd

Manzat Agricultural Intelligence Solutions (Manzat AIS) is a developer of internet-based Agricultural decision support systems for Extensionists (ESOs) and other Agricultural advisors. The best performing system amongst the ESOs in South Africa is Extension Suite Online (ESO). Manzat plays a prominent role in the sharing of knowledge to SASAE members and non-members throughout the country through ESO.

Most Extension Officers and farmers are constantly in search of relevant information that can assist them to perform their daily duties relating to decision making in terms of relevant animal or plant production related questions, hence playing a key role in sustainable agriculture and fully responding to the conference theme – “The Role of the Professional Extensiornist in Sustainable Agricultural Development”. Extension Suite Online (ESO) is a decision support tool which serves as an important linkage and information transfer mechanism between Agricultural Research and Extension, and the farmers that Extension Officers serve.

It facilitates and enhances the transfer of information between these parties by collecting, collating, interpreting and transforming scientific agricultural related data into useful and user friendly formats for use by Extension practitioners and farmers. Since year 2010, four thousand, one hundred and seventy four (4174) Agricultural Officers and Extensions in all the nine provinces have been added to the system and are constantly being trained on how to easily navigate and access ESO.

A poster demonstrating and elucidating the impact of the system since 2010 will be depicted by means of user accounts, graphs, and will be briefly elaborated. This poster will demonstrate the importance of Extension Suite Online as a decision support tool to Extension Practitioners in South Africa.

CONCLUSION
EXTENSION SUITE ONLINE
MADE A DIFFERENCE

Extension Suite Online has made a profound impact on the lives of Extension Practitioners and those that serve and it has greatly improved the relationship between extension practitioners and farmers in South Africa.

As an empowerment and management tool, ESO enables Agricultural Advisors to provide farmers with factual studies to determine the feasibility of the intended farming endeavours, as well as the tools with which to implement these in a more sustainable operating environment for farmers.

Agricultural Information Support System
Contact person: Matsuzkie Mvelase | E-mail address: matsuzkie@manzatu.co.za | Tel: (+27) (0)12 466 2499
Address: Unit 1, Waterkloof Forum Building, 374 Miller street, Waterkloof, Pretoria

AGRICULTURAL INTELLIGENCE SOLUTIONS

Please note, that Mantis offers specialised training programmes for Agricultural Advisors.
IMPACT OF INTRODUCING NGUNI BULLS AS MEANS OF IMPROVING LIVESTOCK IN RURAL AREAS OF QUMBU (BALASI)

N. Mfuduka

INVENTION OF THE PROGRAMME - LIVESTOCK IMPROVEMENT

- The Nguni is indigenous to Southern Africa and known for its high fertility, short calving intervals and long reproductive lifespan.
- According to researchers, a study was conducted to check the resistance of Nguni to ticks, tolerance to disease as well as livestock improvement.
- Nine pregnant heifers, one with a calf and five Nguni Bulls were introduced at Balasi (Qumbu, O.R. Tambo district) in 2008.
- The objectives of the invention of the programme was to produce breeds that are more resistant to drought and disease, have good quality in hide for market, have good fertility status and its adaptability to poor grazing and conditions of excessive heat and humidity.

MATERIAL AND METHODS

- Awareness campaigns were conducted through meetings on the picture.
- Farmers were taken to field tours to the University of Fort Hare farm.
- Implementation of Nguni project involved villages, engaged traditional leaders.
- Nguni were given to the responsible farmer but all participating communities benefited.
- All participating communities expected since livestock grazed together on a free range environment as shown on the picture.

RESULTS & FINDINGS

- Programme of livestock improvement changed quality and quantity of livestock at Balasi.
- According to statistics from 2008 – 2013 about 247 calves were born and mostly the livestock of this ward has changed characteristics and genetic pool to resemble Nguni.
- Mortality has decreased.

RECOMMENDATIONS

- It is highly recommended that the Nguni project be distributed to other areas of Qumbu.
- Construction of infrastructure e.g. camp divisions for breeding purposes improves herbage production and rotational grazing.
- Records to be kept to maintain genetic process of Nguni Bulls.

CONCLUSION

- The Nguni breed introduced in this project has sustained the concept of conservation through utilization in the Balasi farming community.
- The Nguni breed compared to the indigenous breed the balance had the ideal quality suited because of its resistance to ticks and disease.
- Some were sold to Mthatha abattoir.
- Hides have been sold to skin and hides co-op in East London and farmers were able to sell ox of good quality to local farmers for special gatherings.
- Farmers are able to sustain their lives form the income generated. E.g. pay school fees, groceries.
Western Cape - Small Stock Competition for development farmers; a significant extension tool for farmer development

H.J.F. Grobler1
1Western Cape Department of Agriculture, Farmer Support and Development, George, South Africa

INTRODUCTION

Livestock Land reform projects in identified Districts of the Western Cape are integrated into a continual Red Meat Support Program with a framework comprising Planning, Funding, Training, Monitoring and Evaluation and Impact Development (Figure 1) built into an Extension program. Figure 2: Developed an annual support framework

Figure 1: Red Meat Commodity support framework

Figure 2: Scheduled Annual Support based on Biological, economical and human resource survey and analysis

MATERIALS AND METHODS

In 2010 an extension initiative to host a young ewe and a slaughter lamb competition and show for newly settled and other development farmers from the Central Karoo, was launched. The purpose was to:

- Demonstrate individual progress in small stock breeding & management, as the climax of the years’ extension program,
- Provide an opportunity for further training & development,
- Encourage farmer networking and liaison with commercial stud farmers and the agricultural industry,
- Provide an opportunity to grow in confidence, stature, contribute to society and mature as patrons for newcomers to agriculture.

The event has been expanded to incorporate most of Western Cape districts and allow projects from neighboring provinces to participate.

RESULTS

The competition started with 29 projects entered (145 animals and 60 participants) in 2010. It expanded over the years to the following benchmarks in 2014:

- Several Western Cape districts participating (Intra-Provincial).
- Projects from Northern Cape and Eastern Cape participating (Inter-Provincial).
- Industry participation in planning, providing breed stud examples.
- Information sessions on most small stock breeds, Indigenous beef breeds, sheep breeds, shearing and skilfing demonstrations (wool and mohair).
- Practical sessions on ram testing, AI and stock handling.
- Expansion of projects on several days with, abattoir visits, vet evaluation and competitions, developing into an Agri-week.
- Prizes consist of gift vouchers to purchase agricultural inputs.
- Top group rankings are entered at the BeefEX and commercial show with a number of significant achievements.
- 2014 statistics:
  - 500 animals entered, 170 participating farmers & helpers (90 separate animal class entries spanning the Dorper, Boer goat, Wooled, Cross and Angora breeds).

CONCLUSIONS

The hosting of the event as one of the climaxes of the annual stock support programs has become a measurement for project progress, farmer participation and link to the broader industry and agricultural development agencies. It serves as a platform for farmer to farmer and farmer to industry networking. It links farmers of all production levels – from commonerages to stud farmers into the production continuum, recognising contribution however small, raising prestige and implementation of sound practices to improve performance at the next competition (achieving growth on farm level). Expansion of the concept to incorporate performance testing is incorporated in future planning.
THE INNOVATION BY AN EXTENSION OFFICER TO OVERCOME CHALLENGES AT MAKUKHANYE THROUGH PROFESSIONAL APPROACH

A. Rala

INTRODUCTION

- Makukhanye is a maize project situated at Mncoba Village under Nthezulu Local Municipality, Alfred Nzo District. It is 31 km away from Nthezulu town with the cropping program initiated by Department of Rural Development and Agrarian Reform, Eastern Cape. The project currently has 58 members using 40 ha of arable land.
- They were involved in maize programs such as Siyakhula and now they are on a cropping program known as Makukhanye.
- Siyakhula Massive Food Conditional Grant Programme where 15 members of the farm spend their money to buy inputs towards the next season's crops in order to secure support funding from government.
- Siyakhula was also replaced by new cropping system (Makukhanye Project) where farmers were contributing with R180 per ha towards the government assistance.

AIMS & OBJECTIVES

- To ensure sustainable food security
- To increase yield production
- To obtain good quality production
- To encourage farmers to put more arable land into use.
- To promote commercial farming
- To promote the use of modified seed and advanced mechanization

MATERIALS & METHODS

- The study was conducted through participatory methodology whereby a questionnaire and interviews were the tools.
- 20 beneficiaries were sampled, randomly selected and interviewed using semi-structured interviews.
- Semi-structured interviews enabled the beneficiaries voices to be heard in real way, to share their stories, truth, fears and hopes about the programme.

SITUATION BEFORE INTERVENTION

- Just before intervention by Department of Agriculture Mncoba community was ploughing maize, using animal traction, applying kaad manure and using their own indigenous seed.
- As time goes on most farmers couldn't use their fields due to lack of cattle, no means to hire tractors and most of them lost interest and their arable land was wasted and some became grazing land.

Three cobs per maize stalk

RESULTS

- Livelihoods have been improved as they are selling their maize to the Mncoba community and to local poultry projects.
- Farmers are able to take their kids to school, look after their families.
- Their family heads are working at Mncoba mine and the farmers are able to support them.
- More farmers developed interest in maize production as they have already 60 ha been used.
- There is 75 ha in the records of state of readiness for 2014/15 for Makukhanye.

CHALLENGES

- Intercropping: Farmers practiced intercropping earlier which was affecting application of weeding chemicals in their fields. Through workshops and information days the intercropping culture was eliminated and farmers were motivated to use their gardens for other crops such as pumpkins and beans.

RECOMMENDATIONS

- It is recommended that the government should make sure that the inputs and recruiting of contractors in done earlier to avoid delays on ploughing. Failing very site area has had a negative affect on the quality and the yield of production.

CONCLUSION

- The aim of producing high yields improved the average yield by 4 bunches compared to the starting point which was 2001/202. Through the innovations such as using mechanization, modified seed and application of chemical and application of chemicals such as pre-emergent and post-emergent chemical and pesticides.
- Makukhanye as a project is growing bigger and better. It gives hope to many Umzimkhulu beneficiaries.
- The number of beneficiaries has increased from 20 to 58, and we are looking at 75 ha in this coming season 2014/2015.
- Farmers are no longer ploughing for every own consumption, but they like ploughing maize as a business asset.

ACKNOWLEDGEMENT

The author of the study would like to thank the members of Makukhanye Maize Project for their participation to make this study possible. The authors would also like to extend our gratitude to Highrise Farmers Society for their input and speculations towards the improvement of the project. The authors also extend their appreciation to their family for their encouragement and prayer this study to be undertaken.

REFERENCES

GENDER MAINSTREAMING IN AGRICULTURAL DELIVERY IN NIGERIA: A REVIEW OF THEMATIC ISSUES FOR CONSIDERATION

A. Abubakar
Department of Agriculture Education, Federal College of Education (Technical), PMB 134, Ondo, River State in Affiliation with University of Nigeria, Nsukka, Nigeria
abubakarcm@msn.com phone: +234(0)9068827052

Wachesaw, A. and Umunna, R.P.A.
Department of Rural Sociology and Extension, College of Agricultural Economics, Rural Sociology and Extension, Michael Okpara University of Agriculture, Umudike, Abia State.

Introduction: Agriculture is recognized as a major driver of economic growth and poverty reduction for many developing countries. Nigeria included. In a survey, agriculture is a major issue in the country. The concept of the agricultural sector has been the focus of government policy for many years. Despite the economic challenges facing the sector, it is still vital for national development. The sector contributes significantly to the country's GDP and employs a large portion of the workforce. The sector is also important in ensuring food security and reducing poverty in the country. Mainly, agriculture is the focus of the country's economic transformation strategy. The country's agriculture sector is growing, with the goal of achieving self-sufficiency in major food crops and reducing rural poverty. The sector has been identified as a key driver of economic growth in the country.

Gender mainstreaming in agricultural delivery in Nigeria: A review of thematic issues for consideration

The purpose of this paper is to examine the contributions of women in agricultural production and the role of gender mainstreaming in agricultural research and extension delivery. The paper is intended to serve as a basis for engaging in gender-responsive education and training, to improve the overall efficiency of agricultural education and research, and to promote gender-responsive agricultural research and extension programs. The paper aims to highlight the importance of gender mainstreaming in agricultural delivery in Nigeria and to identify areas where improvements can be made.

Women's contributions to agricultural production:

Women's contributions to agricultural production are significant in Nigeria. Women are involved in various agricultural activities, such as farming, animal husbandry, and processing. They are responsible for a large portion of agricultural land and produce. Women's contributions to agricultural production are essential for the country's food security and economic development. Women's involvement in agricultural production is crucial for achieving the goal of food security and reducing poverty. Women's contributions to agricultural production are also important for achieving gender equality and women's empowerment. Women's contributions to agricultural production are essential for the development of the country.

Gender mainstreaming and agricultural delivery:

Gender mainstreaming in agricultural delivery is crucial for ensuring that women have equal opportunities to participate in and benefit from agricultural development. Gender mainstreaming involves incorporating gender perspectives into agricultural policies and programs, and ensuring that women have equal opportunities to participate in and benefit from agricultural development. Gender mainstreaming also involves ensuring that women have equal access to agricultural resources and opportunities, and that women have equal opportunities to participate in and benefit from agricultural development.

Methodology:

The methodology used in this study involved a comprehensive literature review of existing research on gender mainstreaming in agricultural delivery in Nigeria. The literature review was conducted using a range of databases, including Google Scholar, PubMed, and Scopus. The literature review was conducted using a range of keywords, including "gender mainstreaming," "agricultural delivery," and "Nigeria." The literature review was conducted using a range of methods, including qualitative and quantitative methods.

Results:

The results of the study showed that gender mainstreaming in agricultural delivery is crucial for ensuring that women have equal opportunities to participate in and benefit from agricultural development. Gender mainstreaming involves incorporating gender perspectives into agricultural policies and programs, and ensuring that women have equal opportunities to participate in and benefit from agricultural development. Gender mainstreaming also involves ensuring that women have equal access to agricultural resources and opportunities, and that women have equal opportunities to participate in and benefit from agricultural development.

Conclusions:

Gender mainstreaming in agricultural delivery is crucial for ensuring that women have equal opportunities to participate in and benefit from agricultural development. Gender mainstreaming involves incorporating gender perspectives into agricultural policies and programs, and ensuring that women have equal opportunities to participate in and benefit from agricultural development. Gender mainstreaming also involves ensuring that women have equal access to agricultural resources and opportunities, and that women have equal opportunities to participate in and benefit from agricultural development.
OVERGRAZING: A CHALLENGE IN COMMUNAL AREAS OF THE EASTERN CAPE (MTHEBE COMMUNITY CASE STUDY)

INTRODUCTION
- Most areas in O.R. Tambo District of at risk of overgrazing because they do not apply proper veld management practices.
- Overgrazing is also a national concern as eluded by Conservation of Agricultural Resources Act (CARA) Act No. 43 of 1993.
- Overgrazing is excessive defoliation of the grass sward by animals to the detrimental state of the veld or pasture.

PRACTICES THAT LEAD TO OVERGRAZING

Overstocking at Mthebe
When the farmer has more animals on the veld than its carrying capacity

Continuous grazing
When animals stay for long periods on one piece of veld without giving the veld a chance to rest, set seed or grow

Selective grazing
When livestock eat only the grass that is soft and tasty and leave the other grasses that they find unpalatable.

METHODOLOGY
- The grazing area was measured and the total grazing area is 509.3 hectares.
- Veld condition assessment was done in 2013.
- Data was collected and analysed to determine grazing capacity.
- Livestock statistic was as follows: Sheep 2479, Goats 572, and Cattle 721 (Information obtained from local Veterinary Services 2013).

RESULTS & DISCUSSION
Results were as follows:
- The condition of the veld is characterized by a greater proportion of increaser 1 and increaser 2 e.g. Eragrostis Cenchrus, Eragrostis Multiceps etc.
- Increaser 1 dominates in poor veld and with under stocking or selective grazing
- Increaser 2 dominates in poor veld and with overstocking
- Grazing capacity was calculated to be 3.5 ha/au
- The area can only carry 146 large stock or 876 small stock
- Overstocking has occurred in Mthebe
- Therefore overstocking caused overgrazing at Mthebe.

RECOMMENDATIONS
- Fencing of grazing area is highly recommended so as to properly control grazing management
- Division of camps and application of high utilization grazing can assist in suppressing the growth of undesirable species
- Establishment of cultivated pastures can reduce grazing pressure
- In 509 ha, 146 cattle can graze and if the area will be used for sheep only 876 sheep can graze. If both are using the area; the ratio of 1:6 can be applied to minimize selective grazing.
- Reduction of stock is recommended.

CONCLUSION
- Laws governing the management of natural resources should be enforced (CARA, etc)
- Communities should form veld management committees to assist communities in this aspect
- Stock numbers should be regulated.
- Veld assessment is very important for farmers to make informed decision about livestock management.