Synthesis Report

Strengthening Capacity for Agricultural Research and Development in Africa:

Tracer Study on Effectiveness of Agricultural Training Programmes in Botswana, Lesotho and Zambia

January, 2011

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Contents

Abbreviations and Acronymns 4

Executive Summary 5

Background 7

Methodology 9
Target Population and Sample Size 9
Research Instrument 9
Data collection and Analysis 9
Quality Assurance 10
Validation 10

Results 10
Respondents 10
Graduate Survey 11
Curriculum Approach Issues 11
Graduate Labour Market and Employment 12
Career Changes 12
Competencies Possessed by Graduates and those required at work 12
Usefulness of study programmes 13
Utilization of qualifications 13
Additional training 14
Employers Perceptions on Graduate Performance 14
Farmers Perceptions on Graduate Performance 14
Implications of Results 16

Strategies for improvement of agriculture and NRM training in the SADC region 18
Socio-Biographic Background 18
Higher Education 18
Competencies 19
Transition Process 20
Employment and work 20
Labour Market Conditions 20
Socio-cultural conditions 20
Globalization 20
Lessons Learnt 21

Conclusions and Recommendations 22
Curricula 22
Curricula Delivery 22
Management 23
Policy 23

References 24

Abbreviations and Acronymns

ANAFE	African Network for Agriculture, Agroforestry and Natural Resources Education
FANR	Food, Agriculture and Natural Resources
FARA	Forum for Agricultural Research in Africa
ICT	Information and Communication Technology
NARS	National Agricultural Research Systems
NGOs	Non-governmental Organizations
NRM	Natural Resources Management
RUFORUM	Regional Universities Forum
SADC	Southern Africa Development Community
SCARDA	Strengthening Capacity for Agricultural Research and Development in Africa
SROs	Sub-Regional Organizations
SSA	Sub-Saharan Africa
TAE	Tertiary Agricultural Education
UN	United Nations

Executive Summary

The Strengthening Capacity for Agricultural Research and Development in Africa (SCARDA) programme was conceived with the purpose of strengthening the institutional and human capacity of African agricultural research and development systems to identify, generate and deliver research outputs that meets the needs of poor people. One of the key outputs of the programme is that the Tertiary Agricultural Education (TAE) and training institutions are empowered to match the capacity building offered to changing market demand. In the SADC region, the African Network for Agriculture, Agroforestry and Natural Resources Education (ANAFE) was tasked by SADC Secretariat to carry out the "Tracer Study" to identify key skills gaps in graduates from agricultural faculties who are employed in a range of public and private organizations in Botswana, Lesotho and Zambia. The main categories used in the study were employers and employees. Three questionnaires were prepared and used in the study. The questionnaires were for graduate employees, employers and farmers/farmer organizations. This common methodology was used across the three countries. Data were collected from March to November, 2010. Collected data were analyzed in Excel®. Reports were validated through country level workshops involving all key stakeholders. Across the three countries a total of 389 respondents (299 graduate employees, 63 employers and 27 farmer organizations) completed and returned the questionnaires.

Employers valued particular critical competencies in the recruitment of graduates. These include, for Certificate level: Hands-on skills/experience, communication skills, general agricultural knowledge, attitude, leadership ability, understanding financial issues; For Diploma Level: Hands-on experience, theoretical knowledge, supervisory skills, communication skills, farm management skills, financial management skills and leadership ability; Bachelors' level: Professional and technical knowledge, general agricultural/NRM knowledge, specialization in a particular field, adequate theory, hands-on practical skills, managerial/supervisory skills, analytical skills and MSC/PhD level: Strong theory and research skills, good understanding industry with business management skills, good communication skills, ICT skills, leadership ability, policy analysis skills and good proposal and report writing skills.

Employers noted that graduates were deficient in particular important skills and competencies. These included: For Certificate level: Limited competence with ICT, inadequate theory/depth, poor communication skills, poor work ethics, poor record management and limited market knowledge; For Diploma Level: Limited ICT competence, poor communication skills, inadequate theory, limited knowledge of government administration, limited supervisory capacity, limited data analysis skills, low managerial skills, limited market knowledge, limited report writing skills and inability to articulate policy issues; For Bachelors' Level: Lack of practical experience/hands on skills, limited financial management skills, poor communication skills, poor writing skills, not being numerate (i.e. being qualitative rather than quantitative), lack of specialization, limited analytical skills, limited managerial skills, limited knowledge of government administration, limited market knowledge, limited farm management skills, limited professional and leadership skills and For MSC/PhD level: Poor communication skills, insufficient managerial and financial management skills, insufficient knowledge on government administration, poor skills to coordinate with other stakeholders, not rising up to challenges, insufficient skills in proposal and report writing skills, insufficient hands-on skills and poor reading culture.

These results show substantially high weaknesses in the graduates being produced implying that there are serious gaps in the training programmes. This implies a serious disconnect between TAE and industry. However, these observed deficiencies should be viewed as symptomatic of a larger underlying problem in the training programmes which need to be addressed. In this study, the issues were established to be revolving around the need to improve linkages with stakeholders, carrying out regular curricula review, striking an appropriate balance between theory/practice across the various levels, incorporating experiential learning and improving the entrepreneurship components of the training programmes. Policy intervention is also critical. It is only by addressing these pertinent training issues that change can be brought about in the production of a graduate that is relevant to the industry needs.

Background

The livelihood situation of people in Africa is deteriorating (Diao *et al.,* 2006). Africa is the only continent where hunger and poverty are projected to get worse. Statistics show that 80 per cent of all Africans live on a daily income of less than US$ 2 while nearly half struggle to survive on US$ 1 a day or less. More than 200 million Africans now suffer from malnutrition. If change is going to be achieved in sub-Saharan Africa (SSA), then agriculture, particularly smallholder agriculture has to be made to work. From the national level (through documents on poverty reduction strategies) to the continental level (through the Comprehensive Africa Agricultural Development Programme) to the global level (Millennium Development Goals), the smallholder sector has been shown to be pivotal to economic development. However, institutions serving agriculture in SSA are not performing due to various reasons, key of which are deficiency of suitable manpower as agricultural practitioners.

It is against this background that the programme "*Strengthening Capacity for Agricultural Research and Development in Africa (SCARDA)*" was initiated. The purpose of the programme is "*to strengthen the institutional and human capacity of African agricultural research and development systems to identify, generate and deliver research outputs that meets the needs of poor people*".

The SCARDA programme was conceived with two components:

A. Strengthening competencies and capacity in agricultural research management and
B. Strengthening capacity for professional development in agricultural research and development

The programme has four outputs:

1. Agricultural research management systems and competencies to conduct high quality research strengthened in African National Agricultural Research Systems (NARS)
2. The Capacity of African NARS to undertake quality agricultural research for development sustainably strengthened
3. Tertiary agricultural education and training institutions empowered to match the capacity building offered to changing market demand
4. SCARDA approach for capacity strengthening is documented, validated with and owned by key stakeholders

The SCARDA programme is funded by the United Kingdom Department for International Development (DFID). It has been led by the Forum for Agricultural Research in Africa (FARA) and implemented in the SADC region by SADC-FANR of the SADC Secretariat, assisted by the African Network for Agriculture, Agroforestry and Natural Resources Education (ANAFE[1]) as the Lead Service Provider.

ANAFE was commissioned by SADC Secretariat to spearhead implementation of SCARDA output 3 in the three pilot SADC Member States, namely Botswana, Lesotho and Zambia,

[1]ANAFE is a network of 132 universities and colleges in 35 sub-Saharan African countries. In the SADC region alone, it is working with 44 universities and colleges. ANAFE's mission is to improve the quality, relevance and application of agricultural education in Africa.

because of its wide experience in carrying out surveys of the agricultural capacity in Africa and developing strategies, programs and actions that address identified gaps in knowledge and expertise.

The Regional Universities Forum (RUFORUM) was engaged by SADC Secretariat to be in charge of the quality assurance work of the Tracer Study. Specifically, RUFORUM was to:

- Evaluate the methodology for implementing the study;
- Evaluate recommendations of the study; and
- Review and recommend to SADC approval of the synthesis report

This report covers implementation of output 3 in the SADC region. The main activity under this output has been on "Tracer Studies" to identify key skills gaps in graduates from agricultural faculties who are employed in a range of public and private organizations.

The importance of African universities as vibrant centres of excellence capable of propelling their nations into the knowledge economy cannot be over-emphasized. However, despite the importance of agriculture in Africa, tertiary agricultural education (TAE) has not been given the attention it deserves. Agriculture suffers as a result of under investment, loss of staff due to poor incentives and failure to recruit replacements for an ageing cadre of professors in TAE institutions. If agriculture is to be the engine of development in Africa, it must produce relevant agricultural graduates with knowledge in all aspects of production, processing, marketing and policy in addition to the necessary soft skills of working with communities and also having entrepreneurial skills to start their own businesses.

The overall objective of this study was to provide information on the skills and competencies acquired by graduates of tertiary agricultural education systems in line with the ever changing market requirements in the national agricultural research and development industries in Botswana, Lesotho and Zambia. The specific objectives were to:

1. Identify priority skills and areas of competencies needed by the Industry and development sectors
2. Identify the skills and competencies professionals and former graduates possess in relation to Industry requirements
3. Characterize the inputs into training and training processes at selected tertiary agricultural education training institutions
4. Identify specific challenges in priority areas that can be addressed through training
5. Develop recommendations for action in terms of agricultural training and education

Methodology

Target Population and Sample Size

The study was conducted in Botswana, Lesotho and Zambia—the SCARDA SADC focal countries. To standardize data collection and to ensure comparability, a common methodology and survey instruments were adopted.

The study sampling frame adopted is shown in Figure 1. The major categories were employers and employees. The government, private sector, non-governmental organizations (NGOs) and Farmer Organizations were identified as the key sectors to use in the study. Specific organizations were selected for data collection in individual countries.

Research Instrument

Three questionnaires were prepared and used in the study. These were questionnaires for graduate employees, employers and farmers/farmer organizations. The main themes addressed by each questionnaire are shown in Table 1.

Data collection and Analysis

The questionnaires were used to collect data in the field. In some cases, one-on-one interviews were conducted. However, most respondents preferred to complete questionnaires at their own time. The completed questionnaires were later collected at a convenient time for analysis. For employees in remote areas, a number of questionnaires were left at their headquarters and the employees completed them on their regular scheduled visits to headquarters. The data collection period was from March to November, 2010.

Figure 1. Study sampling frame

Table 1. Main themes addressed by each instrument

Questionnaire Category	Main themes addressed
Graduate Employees	Educational background prior to study; Higher education courses taken; Job search and sequence of professional activities; Current employment and work; Job requirements competencies and qualifications; Relationship between higher education and work and Further education and training
Employers	Competencies required in graduate employees; Major strengths and weaknesses in graduate employees and Areas in need of improvement in certificate, diploma, degree and post-graduate level training
Farmers/ Farmer Organizations	Major sources of extension advice they use; Major problems experienced in farming activities; How well they perceive the extension systems as adequately helping them and Issues they perceive need to be improved upon in extension personnel training.

Based on the questionnaires, electronic templates were designed for electronic data capture. The data were further transferred to Excel® for statistical analysis. Since the tracer study covered Certificate, Diploma, BSc, MSc and PhD graduates, the data were analyzed separately for these five groups so as to avoid any confounding effects of the responses.

Quality Assurance

Quality of study was assured at two levels. At the first level, the Regional Universities Forum (RUFORUM) was engaged by SADC to be in charge of the quality assurance work of the Tracer study. As an internal arrangement, ANAFE also set up a three member team which monitored data collection in the field, analysis, write up and validation.

Validation

Following production of the individual country reports, validation workshops were carried out in all three countries involving the major stakeholder categories: Employers, Training institutions, farmer organizations, NGOs, Students and relevant Ministry to review the reports as an input into developing future tertiary agricultural and natural resource management training programmes. Inputs from the validation workshops were used to improve on individual country reports.

Results

Respondents

Across the three study countries a total of 389 respondents completed and returned the questionnaires. The categories by numbers are shown in Table 2.

Table 2. Respondents completing and returning the questionnaires

Country	Graduates	Employers	Farmers/ Farmer Organizations	Total
Botswana	101	23	6	130
Zambia	110	22	17	149
Lesotho	88	18	4	110
Total	299	63	27	389

Graduate Survey

Curriculum Approach Issues

Across the three countries, on the modes of teaching, the rating for theories, concepts and paradigms tended to be less emphasized at certificate level than at diploma and higher levels of qualification (BSc, MSc, PhD). On the other hand, practical skills were emphasized more at certificate and diploma levels compared to BSc and higher qualification levels. These results correspond to the observations from the participating employers in the present study who indicated that employees at lower levels of qualification (certificate and diploma) were strong at hands-on skills but not on theory. The converse was true for higher levels of qualification. These (in)adequacies among the graduates were reflected in their performance in the industry.

Similarly across the three countries also, the freedom to choose courses and areas of specialization, writing a thesis or other assignments and chances to participate in research were generally lower at certificate level and progressively increased as the level of qualification increased. This had a negative effect on the performance of certificate holders. The expectation of industry was for graduates at all levels of qualification to have some kind of specialization while having general knowledge in agriculture.

The out-of-class contact between students and teaching staff was lower at certificate, diploma and BSc levels compared to MSc and PhD levels. However, across all the countries and levels of training, contact was unsatisfactory. Similar trends were found with regards to students having impact on university or college policies, availability of equipment and stocking of libraries, and supply of teaching materials. From these results, we conclude that the generally low field performance by graduates at lower levels could be associated with their experiences during training. For example, the low out-of-class contact with teaching staff meant that the students did not have opportunities to learn from their lecturers on the wisdom of leadership and also to have impact on how the institutions could be run more effectively. The poor stocking of libraries, lack of equipment and teaching and learning materials meant that at lower levels of qualification, the graduates were not exposed adequately, and to a large extent, this could be the reason of poor reading culture observed among many graduates who participated in this study across the three countries.

The graduates' competencies in selected computer software packages, both at the time of their graduation and at the time of the tracer study, were generally not good at all levels of qualification including MSc and PhD. Of course there was a general progression, with

graduates at certificate level having been in the worst position and PhD holders having been in a better of position than the other levels of qualification. In particular, competencies in programming languages, spreadsheets, database and statistical packages tended to be below average. Only skills in word processing seemed to be a little better compared to the other software packages. The conclusion in this respect was that TAE institutions were not investing adequately in ICT training, leading to poor performance in the application of the technologies.

Graduate Labour Market and Employment

The labour market for the graduates included the public sector, private sector, NGO sector, UN systems and public-private institutions. However, one major observation was that the time taken by graduates between the time of completion of their study programmes and the time of finding employment had a wide range (from upon graduation to four years). The implication of this wide range of time was that the jobs were not readily available and progressively appear to be getting even scarce. Another major observation across all countries was that a very small percentage of the graduates indicated that they did not bother to get formal employment and opted to start up their own businesses. The conclusion from these two scenarios could be that TAE institutions in the three countries were probably training job seekers rather than job creators. This calls for an urgent change in the training approach. Even in Botswana, with a number of programmes in place to support Agribusinesses, the number of graduates venturing into self-employment was dismal.

Career Changes

The majority of the graduates indicated that they spent most of the time on their regular job. Reasons for changing jobs included promotion, closure of companies, need for greener pastures or better conditions, need for job security, need for more experience and unstable contracts. Thus, some people changed jobs by choice, while others changed as a result of reasons beyond their control. But interestingly, none of those who indicated that they had changed careers said they had set up their own businesses.

In terms of anticipation of career changes in the near future, the graduates indicated a wide range of changes – within the agricultural profession or a completely different field or profession altogether. Those who indicated shifting to other careers indicated professions like health, pharmacy, nutrition, veterinary law, accountancy, computer science, banking and marketing. A few did mention setting up their own businesses. This wide range of anticipation is a matter of conjecture. For those who wanted to move out of the profession altogether, one would interpret this to mean agriculture was probably unattractive. For those who wanted to move on within the profession (including self-employment), one would interpret this to mean dynamism in the agricultural field.

Competencies Possessed by Graduates and those required at work

Many graduates felt that they did not possess the necessary competencies at the time of their graduation as what was required at their place of work. In general, however, the higher the level of qualification, the higher the proportion of graduates who possessed competencies such as broad general knowledge, cross-disciplinary thinking, field specific theoretical knowledge, problem-solving ability, analytical competencies, creativity,

negotiating skills, critical thinking, leadership, assertiveness, decisiveness and persistence. The certificate holders were the lowest on the ladder while PhDs were the highest in terms of possession of these competencies.

The only competencies that were possessed by at least 70 per cent of the graduates (overall) at the time of their graduation included learning abilities, accuracy and attention to detail, time management, critical thinking, oral and written communication, and taking responsibility. Competencies such as computer skills, planning, coordination and organizing, were possessed by less than 30 per cent of the graduates overall. Yet, for most competencies, 80 to 100 per cent of the graduates indicated that they were required to a high degree at their place of work. It was generally concluded from the results that the training institutions were not adequately preparing the graduates and that graduates had to seek further studies for them to feel adequately prepared for their jobs.

Usefulness of study programmes

A greater percentage of the graduates indicated that the programmes they followed at various institutions were useful. In addition, most of these graduates indicated that not only were the study programmes useful to their job situations but were also useful for preparing them for other spheres of life. In this respect, some graduates indicated that the programmes prepared them for leadership/management, creation of jobs, running their own businesses, team work, to take up new challenges as well as to understand many issues in life and the ability to reason critically.

An evaluation of certain attributes within the study programmes was done. These attributes included course content of the major that the respondents pursued, opportunity to specialize, research and practical experience, and internships. Generally, the majority of the graduates indicated that these attributes of the study programmes were useful. It was, however, interesting to note that not many graduates indicated that internship was useful. It was interesting in the sense that most graduates are expected to gain hands-on experience through internships so that when they are employed, they already have some work experience. There might be a need to review the whole internship programme across the three countries to ensure that it will be relevant to the graduates' future work areas.

Utilization of qualifications

While overall the majority of the graduate respondents indicated that their qualifications were just right for their positions, a notable number also expressed that their levels of qualification were below what was appropriate for the positions they were holding. On the other extreme a few of the respondents expressed that lower qualifications would have been more appropriate for the positions they were occupying. The implication of these results was that a significant number of the graduates were performing functions that they were not qualified for, while some were performing functions that they were over-qualified for. It might also be an indication of the graduates' need to pursue further studies or general frustrations met at work.

With regard to expectations, the graduates had at the time of starting and completing their programmes, seemed to have been satisfied to a large degree. For example, more than half of the respondents indicated that their current work met their expectations better than they expected. Segregated by level of qualification, more than half of respondents at

certificate, diploma and PhD levels rated the conditions at their current work to be better or much better than they expected, both at the beginning and completion of their programmes. It was only at BSc and MSc levels where just under half of the respondents indicated that their expectations were met to a large extent at the time of beginning their programmes.

Additional training

Overall, the majority of the graduates indicated that they undertook further training after their graduation. Segregated by employment sector, it was found that more employees from the NGO sector attended additional training compared to the other sectors. Understandably the private sector in this regard was at the bottom of the ladder. A wide range of trainings were undertaken, ranging in duration from one week to six months. While some respondents indicated that they attended the training during paid work time, others indicated that the training was done outside paid work time. The motivation for additional training varied and included acquisition of further knowledge and experience and broadening of knowledge, better employment prospects in future, change of salary scale, adaptability and improved personal performance, keeping abreast with new trends in industry, improving performance at work, and positioning oneself to undertake other responsibilities. While the majority of the respondents indicated that the training had great impact on their ability to carry out their tasks, they did not think this additional training raised their status in society.

On the reading culture, very few of the graduates indicated that in the past 12 months, they had read subject related professional materials at least once a week. About half of the respondents indicated that they only read subject related materials once a month. The remaining ones seldom read any materials or did not even read at all. In general, the higher the level of qualification, the more regularly the respondents read the subject related professional materials. With regard to the use of internet, overall about half of the respondents indicated that they used this facility at least once a week. Certificate holders were at the bottom of the ladder. It was interesting that more people (especially BSc holders) used the internet for emails and general browsing compared to reading subject related professional materials.

Employers Perceptions on Graduate Performance

The employers indicated the competencies they looked for in recruiting the graduates. Table 3 gives the competencies, segregated by level of qualification:

These results indicate more weaknesses than strengths among graduate employees. This implies serious gaps in the training of agricultural/NRM professionals in TAE institutions. There is urgent need to address this situation.

Farmers Perceptions on Graduate Performance

Most farmers expressed disappointment with regard to the fact that the key institutions that employ graduates did not offer advice to them regularly. While extension officers from the Ministry of Agriculture were said to be providing advice sometimes, the farmers indicated that the officers from the Forestry department and university academia rarely interacted with them. It was clear from their expressions that practically the interaction

Table 3. Summary of skills required by employers from graduating students and graduates strengths and weaknesses across Botswana, Lesotho and Zambia

Certificate Level	Diploma Level	BSc Level	MSc/PhD
Skills Required			
Hands-on skills/ experience, communication skills, general agricultural knowledge, attitudes, leadership ability, understanding of financial issues;	Hands-on experience, theoretical knowledge, supervisory skills, communication skills, farm management skills, financial management skills, leadership ability	Professional and technical knowledge, general agricultural/NRM knowledge, specialization in a particular field, adequate theory,, hands-on/ practical skills, managerial/ supervisory skills, analytical skills;	Strong theory and research skills, good understanding of industry with business management skills, good communication skills, ICT skills, leadership ability, policy analysis skills, and good proposal and report writing skills.
Strengths of Graduating Students			
Good hands-on skills/experience;	Hands-on skills/ experience, good technical background, ability to plan and prioritize work, ability to do laboratory work and collection of data, adaptation to new situations;	Adequate theory, knowledgeable in a wide range of subjects, ability for self-supervision, eagerness to learn new things, ability to design projects and coordination of activities, good writing skills, ability to articulate policy issues	Ability to articulate policy and technical issues, independent in executing their duties, very strong at research and report writing, mobilization of funds through writing proposals.
Weaknesses of graduating students			
Limited competence with ICT, inadequate theory/depth of understanding issues, poor communication skills, poor work ethics, poor	Limited competence with ICT, poor communication skills, inadequate theory, limited skills of government administration, limited supervisory capacity, limited	Lack of practical experience/hands-on skiills, limited financial management skills, poor communication skills, poor writing skills, not	Insufficient communication skills, insufficient managerial and financial management skills, insufficient skills

Table 3. Contd.

Certificate Level	Diploma Level	BSc Level	MSc/PhD
record management, limited market knowledge;	skills of data analysis, low man agerial skills, limited market knowledge, limited report writing skills, inability to articulate policy issues;	being numerate (i.e. being qualitative rather than quantitative), lack of specialization, limited analytical skills, limited managerial skills, limited skills of government administration, limited market knowledge, limited farm management skills, limited professional and leadership skills;	of government administration, poor skills to coordinate with other stakeholders, resistant to challenges, insufficient skills of proposal and report writing skills, insufficient hands-on skills (too theoretical at times), poor reading culture.

between themselves and agricultural and NRM professionals was very minimal. This is despite the fact that smallholder farmers produce the bulk of food in all the three countries Botswana, Lesotho and Zambia. The farmers indicated that they lacked knowledge in many areas and needed technical and professional advice of the graduates. There is a need to enhance linkages between the development sectors and farmers.

Implications of Results

These survey results suggest a number of observations and generalizations. The employers clearly identified the critical competencies they looked for in recruiting graduates by level of qualification (Table 3). These include, for Certificate level: Hands-on skills/experience, communication skills, general agricultural knowledge, attitude, leadership ability, understanding financial issues; For Diploma Level: Hands-on experience, theoretical knowledge, supervisory skills, communication skills, farm management skills, financial management skills and leadership ability; Bachelors' level: Professional and technical knowledge, general agricultural/NRM knowledge, specialization in a particular field, adequate theory, hands-on practical skills, managerial/supervisory skills, analytical skills and MSC/PhD level: Strong theory and research skills, good understanding industry with business management skills, good communication skills, ICT skills, leadership ability, policy analysis skills and good proposal and report writing skills. These are the priority skills and areas of competence needed by industry and development sectors. In training therefore, these are the key skills and competencies that need to be imparted to students.

An assessment of the strengths that current graduates possess was also carried out. The key ones which are prominent by level of training included: For Certificate Level: Good hands-on skills/experience; Diploma level: Hands-on skills/experience, good technical background, ability to plan and prioritize work; ability to carry out laboratory work and

field data collection and adaptation to new situations; For Bachelors' level: Adequate theory, knowledgeable in a wide range of subjects, ability for self-supervision, eagerness to learn new things, ability to design projects and coordination of activities, good writing skills and ability to articulate policy issues and MSC/PhD level: Ability to articulate policy and technical issues, independence in activity execution; very strong research and report writing and mobilization of funds through writing winning proposals. These skills and competencies should be taken into context within the industry and development sectors' current needs so that areas for improvement can be identified. However, we need to build on these strengths as we address the other issues required by industry. It is by addressing areas of need that TAE institutions can make a contribution in producing a relevant graduate for the current socio-economic conditions.

The major weaknesses highlighted by category included: For Certificate level: Limited competence with ICT, inadequate theory/depth, poor communication skills, poor work ethics, poor record management and limited market knowledge; For Diploma Level: Limited ICT competence, poor communication skills, inadequate theory, limited knowledge of government administration, limited supervisory capacity, limited data analysis skills, low managerial skills, limited market knowledge, limited report writing skills and inability to articulate policy issues; For Bachelors' Level: Lack of practical experience/hands on skills, limited financial management skills, poor communication skills, poor writing skills, not being numerate (i.e. being qualitative rather than quantitative), lack of specialization, limited analytical skills, limited managerial skills, limited knowledge of government administration, limited market knowledge, limited farm management skills, limited professional and leadership skills and For MSC/PhD level: Poor communication skills, insufficient managerial and financial management skills, insufficient knowledge on government administration, poor skills to coordinate with other stakeholders, not rising up to challenges, insufficient skills in proposal and report writing skills, insufficient hands-on skills (too theoretical at times), poor reading culture.

These results show more weaknesses than strengths in the graduates being produced implying that there are serious gaps in the training of agricultural/NRM professionals in TAE institutions. This shows a serious disconnect between TAE and industry. There is an urgent need to redress this situation.

The noted performance inadequacies of the graduates by industry are just a symptom of a larger underlying problem during training. This study also characterized the inputs into training and training processes at the institutional level. Issues of curriculum content and delivery were isolated in-depth. It is only by evaluating these issues that recommendations for improvement of the training programme can be derived.

Assessing the curriculum approach issues, we established that:

1. There is more emphasis on practical issues at lower levels of training (Certificate and Diploma) than at higher levels. Results from the employers' survey corroborated these findings.
2. The freedom to choose areas of specialization was limited for lower levels of qualifications (Certificate and Diploma) than higher levels. The expectation of industry was for graduates at all levels of qualification to have some kind of specialization while having general know ledge in agriculture.

3. The out-of class contact between students and teaching staff was lower at certificate and diploma levels than for higher level qualifications. The pattern was the same in terms of contact between students and staff in terms of influencing policy at training institutions. This position would influence subsequent performance of student upon graduation.
4. Libraries were not adequately stocked with recent literature. Also Internet facilities were not widely available to students. This would lead to perceived poor reading culture and the ability of graduating students to be keen to keep up with developments in their line of work.
5. There is general limited contact with stakeholders. Students rarely partake in experiential learning. Students noted that the internship programmes as currently constituted need to be reorganized to be relevant. Therefore instilling the right work ethic and soft skills during training becomes a problem. Institutions cited costs for such an undertaking as being prohibitive. Curricula which should be reviewed every five years are not being reviewed. Stakeholders have no formal channels of providing feedback to training institutions.

These issues regarding curricula content and delivery need to be addressed if we are going to make a change and revamp the training programmes. The issues revolve around improving linkages with stakeholders, carrying out regular curricula review, striking an appropriate balance between theory/practice across the various levels, incorporating experiential learning and improving on the entrepreneurship components of the programmes. It is only by addressing these pertinent training issues that change can be brought about in the production of a graduate that is relevant to the industry.

Strategies for improvement of agriculture and NRM training in the SADC region

For the improvement of tertiary agriculture and natural resource management training in the SADC region, there is a need to look at the key inputs into the training programme in relation to the competencies required by the job market in a holistic manner. This should also take into account aspects of globalization. Figure 2 presents a framework which will be used in to put into context the key issues involved. The key components include: Socio-biographic background; Higher Education; Competencies; Socio-Cultural conditions; Transition process; Employment and work; Labour market conditions and issues of Globalization.

Socio-Biographic Background

While students enter Colleges and Universities in Botswana, Lesotho and Zambia largely from completing “O” level studies, more effort should be made on attracting female candidates. There is also a need to consider motivation of students in the selection process so that those with a vocation in agriculture have a chance to enroll. It is only by targeting students with a vocation in agriculture that we can be able to have role models promoting the actual value of agriculture.

Higher Education

It appears like TAE institutions across the three countries are well-staffed and the student: teacher ratio favourable. However on further discussions with the TAE authorities in

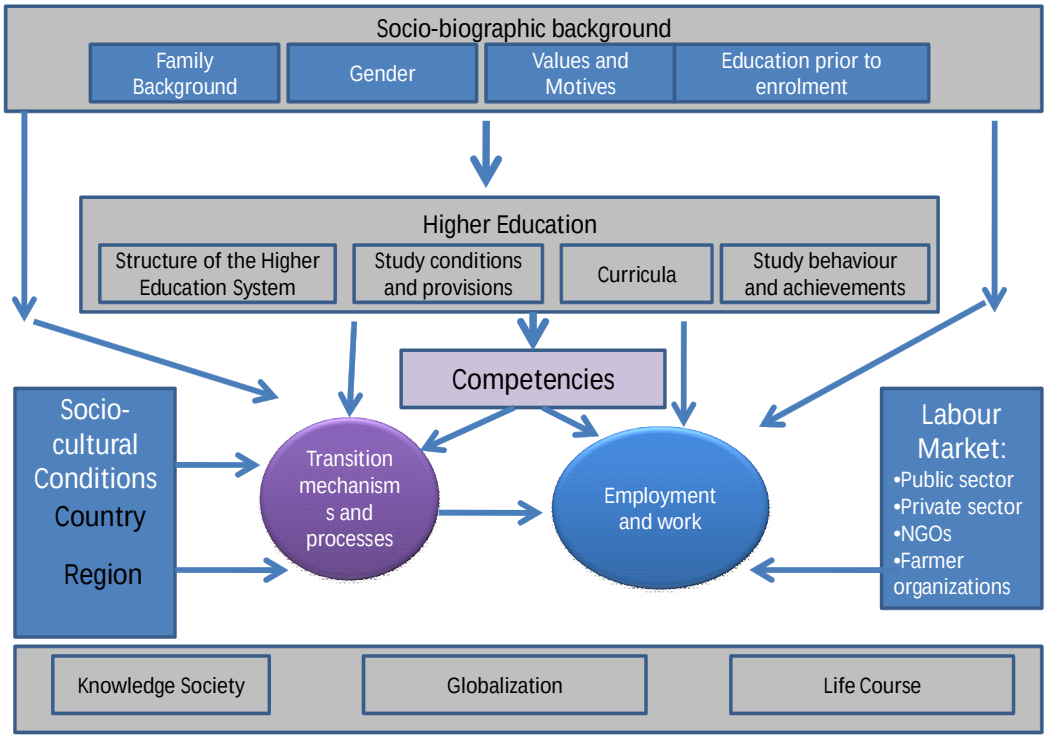

Figure 2. Framework for improving tertiary agriculture and natural resource management education (Modified from that of Schomburg, 2008)

these countries, it was noted that laboratory facilities were inadequate to enhance hands-on practicals with students.

There is a need to integrate experiential learning into the programmes offered. More resources need to be availed for this purpose. Curricula also need to be reviewed periodically—ideally every five years, as is required by the institutions. Effort needs to be put into undertaking this exercise.

Graduates have been criticized as not being hands-on. During the study programme, more effort needs to be put into ensuring that students get involved adequately into the practical work. More practicals need to be included in the final grading of the students' certificate/degree programme. Greater weight needs to be placed on grades that reflect performance in practical classes in the grading system in order to reward skills acquisition.

Competencies

The employers highlighted a number of areas they would want to see improvement in the graduate competencies. There is a need to involve stakeholders in the curricula review process and also ensuring that they are part of the training process ensuring students get adequate exposure. Tracer studies should be in-built within the TAE institutions framework so that there is constant feedback on performance of graduates in the field back to the training institutions.

Transition Process

It appears as though graduating students easily find employment right across the three countries. However, a worrying trend has been the recent graduates who have been having difficulties in securing formal employment. This implies that the normal sources of employment are drying up. The TAE institutions in the region need to emphasize more entrepreneurship courses and encourage students into embarking on self-employment.

Employment and work

The respondents in this study appeared in general as being set in their particular positions, awaiting retirement. Very few of them indicated the need for them to change their jobs in the near future. A worrying trend is the fact that very few of the graduates are creating their own agricultural enterprises. Again this call for a need to look at the curricula and examine how these components can be infused into the training programme.

Labour Market Conditions

Employers emphasized the need for graduates to be current in their technical and practical skills and to have leadership and management skills. Tertiary agricultural education institutions in the region need to work closely with employers to make sure that these components are infused into the curricula. Slowly, the employers are losing confidence in the graduates being produced. There is a need to revamp the training programme to ensure that it remains responsive to the market needs.

Socio-cultural conditions

Botswana, Lesotho and Zambia as individual countries are looking at ways of improving agricultural productivity. In addition, employment and livelihoods of the people is highly dependent on agricultural activity. Opportunities for exports within the SADC region also abound as the region has always experienced food deficits throughout the years. Tertiary agricultural education institutions need to train the cadre of graduates which will service the extension, research, marketing and policy aspects of agricultural production in these countries. Close cooperation with the communities in agriculture is imperative to improve the situation.

Globalization

Botswana, Lesotho and Zambia might be individual countries. However, they are part of the global village. The ultimate target is to ensure that graduates being produced in the tertiary agricultural and NRM institutions are world-class. Curricula should ensure that this is achieved. It was impressive to note that most of these institutions have substantial numbers of expatriates on their staff. This is the way to go if international standards are to be maintained. An added benefit is that students' learning is enriched from different world experiences which will be useful for their future aspirations.

Lessons Learnt

A number of lessons have been learnt in carrying out this study. Given the nature of the study itself, key lessons are derived from commonalities and contrasts observed across the countries and some methodological issues. Key lessons learnt are the following:

1. Agriculture production is given high priority in all the three countries from the perspectives of food security at household level, social security point of view (employment perspective) and from the income generating potential both in the domestic and export market. The mission statements of the Ministries of Agriculture in all three countries all point to enhanced agricultural productivity and reduction of poverty and better management of natural resources. Infact a number of programmes are in place aimed at stimulating agricultural productivity in the three countries.
2. Right across the three countries, students pursue TAE after completing "O" level studies. Authorities are still grappling on how to engage more female students and also how to get the student who has a vocation in agriculture. This is not an easy proposition but needs to be pursued with vigour if the region is going to produce agricultural production role models.
3. The institutions in the three countries seem adequately staffed. However, there are general shortages of laboratory space and practical facilities and challenges on how to embark on experiential learning. The institutions cited the prohibitive costs associated with embarking on experiential learning.
4. Employers in the three countries are not satisfied with the current graduates being produced. There appears to be a general disconnect between the industry requirements and training institutions focus. Additionally, the graduates being produced appear outdated. Given that all the three countries' economies are liberalized, focus should be on tailor-making production of a graduate suited to the industry purpose.
5. Institutions appear to be producing job seekers rather than job creators. Given the fact that throughout the region, jobs in the public sector are running out, graduating students are facing challenges in securing employment.
6. There are very weak linkages linkages of training institutions with stakeholders in general. As a result, there is limited mechanism for providing feedback to the training processes which is critical if we are going to institute some changes.
7. There is general acceptance of expatriate staff in these institutions of higher learning. This enriches the training programmes.
8. None of the institutions surveyed had carried out tracer studies before. This calls for a need to have an inbuilt mechanism across all institutions on tracing all graduating students performance in the industry. This will be able to inform curricula review on an on-going basis.
9. The internal quality assurance system instituted by ANAFE enabled the rapid completion of data collection, analysis, write-up and holding of rewarding validation workshops.
10. While the information provided in this report provide a rapid assessment of the *status quo* of competencies and deficiencies in TAE in Botswana, Lesotho and Zambia, long term studies involving many more institutions, many more student numbers and employment sectors so that a more complete picture can be generated, hence the need to institutionalize tracer studies.

Conclusions and Recommendations

It is concluded from the results obtained in these three countries (Botswana, Lesotho and Zambia) that there seems to be a disconnect between training institutions on one hand and the industry/farmers on the other. The following strategies need to be considered in order to enhance agricultural and NRM training in the SADC region. They are classified under Curricula, Curricula Delivery, Management and Policy issues:

Curricula

1) At the levels of certificate, diploma and BSc, it is proposed that a strong component of entrepreneurship courses be added in order to equip graduates with skills to start up their own businesses rather than only looking forward to being employed. Related to this is the provision of an environment by government through policy and legal frameworks to enable graduates in the agricultural/NRM profession to successfully start up businesses that would eventually create employment.
2) The BSc programme and higher levels of qualification should include a strong component of management courses because these graduates are normally given management positions when they are recruited. Further, components of leadership skills, proposal and report writing, must be part of the curriculum.
3) Courses in ICT, communication skills and work ethics should be introduced at all levels of qualification and must be mandatory. These courses should be designed such that they do not simply bring out the theory component but must be practical. With regard to ICT, this means investing in computer hardware and software.
4) Industry needs graduates who have some specialization. Therefore, while general agriculture is taught at certificate, diploma and BSc levels, some degree of specialization and flexibility in choosing courses by students needs to be considered seriously.
5) There is need to introduce vibrant programmes in emerging fields, e.g. fisheries science. Students need to be exposed to the realities of the World at large. With the World becoming a global village, graduating students need to be aware of where the global opportunities can be found.
6) Training institutions must regularly review their curricula to ensure that they are always relevant to industry. However, there is absolute need to include all stakeholders in this process.

Curricula Delivery

1) Emphasis on theory and research should be strengthened at certificate and diploma levels while hands-on skills/practical experience should be strengthened at BSc level. While indeed these modes of teaching cannot be emphasized to the same degree at the different levels of qualification, striking some balance between these aspects would add value to the programmes. Strengthening hands-on skills/practical experience at BSc level means investing in facilities such as farms and research stations where the students can be exposed adequately during the course of their study.
2) Establishment of strong linkages between TAE institutions on one hand and government and industry on the other is critically important. One of the major reasons for the weak performance of the agricultural sector is this very weak linkage between the major players right across the three countries. It is proposed that through some policy framework, industry should be encouraged to participate in the practical aspect of

training students by availing facilities where the students can do practicals for the purposes of exposure and hands-on experience.

3) More work needs to be placed on the study behaviour of students and ensure that a student enrolled for agriculture and NRM, graduates knowing how to practice agriculture.

Management

1) Greater effort needs to be put on enrolling women students. This is particularly so in Zambia and Botswana.
2) More PhD programmes need to be initiated in the region. Botswana has made a start. Regional PhD programmes should also be encouraged.
3) There is a need for universities within the region to work closely with Diploma and Certificate offering institutions in some form of affiliation mode.
4) Investment in the infrastructure for effective teaching and learning: This means meeting the minimum requirements in terms of lecture rooms, teaching aids, laboratory space and equipment, well stocked libraries, and adequate internet facilities.
5) In order to ensure that the students enrolling into agricultural/NRM programmes have real interest, a long-term strategy would be to select students with a vocation in agriculture to actually enrol in the programme.

Policy

1) Teaching/research staff in TAE institutions must find relevance to directly engage with farmers/producers through outreach programmes and extension work. This could be achieved through university/college policies.
2) There should be a deliberate policy to introduce continuing education in agriculture and NRM so that graduates are continually exposed to new information and technologies. This way, the graduates will be kept abreast of the current trends and will be more effective in their delivery. Botswana in this regard is leading the way but more needs to be done.
3) There must be a deliberate policy to increase interaction between students and academic staff (e.g. through academic advisors). Further, students should be allowed to play a role in decision making so that they also have impact on policy making in an institution. It must be realized that students are the first clients in training institutions. They are, therefore, very important stakeholders and must be given an opportunity to influence policy in the institutions that they attend.
4) The idea of graduates at lower levels studying and upgrading themselves (say from certificate to diploma level or diploma to BSc level) is good but may not always bring positive results. Training at the technician level is critically important for the country because these are the people that are directly in contact with the farmers/producers. Emphasis on obtaining degrees at the expense of technical programmes is not strategic and falls short of the needs of the farmers. To this effect, training at the lower levels must be made more exciting and more challenging. Further, certificate and diploma holders should be remunerated better that what is currently obtaining so that these people are more motivated for better delivery of the service.
5) It is proposed that governments enact laws to regulate the practice of agriculture at professional level through legal bodies. This means all graduates at all levels will need to be registered with this body in order for them to practice. Such a law would

contribute significantly to the enhancement of professional training in TAE institutions and industry and the agricultural sector benefit to a large degree.

6) Tertiary agricultural education Institutions in the SADC region need to work together more closely. SADC needs to work towards a position whereby credits can be transferred from an institution in one country to the next given the similarities already existing.

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