# Part 5

## Completing your thesis

# 5.1 Writing your thesis[1]

*Kay Muir-Leresche*

- **You must make the essential components of your work readable by a broad audience**
- **Be logical and consistent in your arguments**
- **Be rigourous in your approach and do not make unsupported statements**
- **Be aware of your bias and avoid allowing it to influence your work**
- **Be aware of which approach you are using for each hypothesis. Use historical analysis, literature reviews and case studies for deductive reasoning. Use statistically valid samples and experiments for inductive generalisation**
- **Writing a thesis needs 'soul' time. Be sure to allow yourself the space to be creative**
- **Set yourself deadlines and be strict in enforcing them**
- **Remember your work is only one step towards the transformation of rural areas**

***'A poorly written thesis can result in failure of otherwise excellent research. A well-written thesis cannot rescue poor research but it can help a marginal thesis pass.'***

**Derived from Stan Taylor (1996)**

## Introduction

Your thesis is where you bring together all your work and make it intelligible to your peers. It is very important that you make every effort to present your research professionally. Do not throw it all together and hope that the value of your research will enable you to pass.

You should produce a thesis which is clear, concise and both comprehensive and comprehensible. Any person who understands their topic well enough is able to provide a clear explanation. The analysis and the proofs contained in the thesis may only be clear to a specialist in that area but your interpretation of them and your rationale for using a particular approach need to be as simple as possible. This is particularly relevant for work in rural development where problems are not discipline-specific and people from other disciplines must understand your research.

Avoid using **jargon** where possible. Your examiners are more likely to be impressed if you can simplify what you are writing so that it is clearly understood. Jargon is often open to the dictates of fashion and your work will stand the test of time better if you can avoid using it. It should be distinguished from technical language. Jargon is language characterised by pretentious syntax, vocabulary or meaning. **Technical language** uses words or phrases that have special meanings in a specialised subject; such language is useful provided the special meanings are defined explicitly.

1 Common practice uses thesis and dissertation interchangeably but they are different. A **dissertation** is a formal written discourse on a subject, whereas a **thesis** sets out to provide original research to prove or disprove a particular argument. A thesis is normally submitted for a doctorate and a dissertation for undergraduate and taught masters degrees. The advice given in this book for theses, applies equally to dissertations.

Your thesis will be available from your university library for others to read, even if you do not publish it as a book or in journal articles. It reflects on your university, your faculty and in particular on you and your department. You need to produce a high-quality thesis because it will affect your reputation.

## The structure

You need to set out the thesis so that your reader is able to follow a logical path. This path outlines:

- Why you undertook to do the research (the research problem) and how it fits into a wider research and development strategy
- What work had gone before (literature review)
- What you are going to test (hypotheses and research questions)
- How you collected the information, and the information collected (research methods and data tables or historical information)
- How you analysed the information (analytical tools)
- What the results were (results of analysis)
- What these results mean in terms of your hypotheses and objectives (interpretation and conclusion)
- What they mean for policy
- What actions can be taken
- What further work would contribute to better systems.

Stan Taylor (1996) uses the analogy of an explorer producing a guidebook to clarify your role as a researcher writing a thesis, or dissertation. As the author of the guidebook you need to explain:

- Your starting point and why you decided to embark on the journey
- How you decided to undertake the journey
- The route you followed and the discoveries you made on the way
- How, in the light of the above, you redrew the route
- Where you arrived at the end of your journey
- How it differed from your starting point
- Where you go from here.

This logical progression is normally achieved by following a fairly well laid-out structure. The structure of the main body of the thesis will vary, and will be subject to the specific requirements and norms of your own university. Whatever the structure all the following elements need to be incorporated into your thesis.

### Title

A title should be as brief as possible but should still indicate precisely what is covered. It may be useful to provide a sub-title which places the research into its precise geographic, social or other niche.

The title page of your thesis should include the Title (and sub-title if used), your full name, the name of the degree to be awarded, your Department, Faculty and University and the month and year submitted for examination.

### Abstract

Think of your abstract as your explanation to an aunt of what your research is about, what you discovered, and what it means. It is very important that you do not use the abstract as an introduction. It must give a synopsis of your most important results as well as indicating why the research is important and what its implications are. The abstract needs to either explain or avoid technical terms. If, for example, your results include a domestic resource cost (DRC) ratio, then say: The DRC of ..... indicates that there is (or is not) a comparative advantage in producing x.

**The abstract should be no longer than one page of single-spaced text.**

### Acknowledgements and dedication

You do not need to include a dedication but you may like to. Alternatively you can include your dedication in the acknowledgements. The acknowledgements should highlight your supervisor(s) role and those of any other mentor who has assisted you. You can use the acknowledgements to indicate where part of your thesis may be particularly beholden to someone else, e.g., if you used someone to develop or help you develop a mathematical model. Keep this section as brief as you can and avoid a long list of names that includes everyone to whom you spoke.

### Acronyms, abbreviations and glossary of terms

An acronym is a word formed by the initial leters of other words, such as ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). An abbreviation may be formed by the initial letters of words or in some other way but it does not create a new word, such as UN. If you use very specific terms, or vernacular terminology they should be explained in a glossary. Where you put this list differs, and you should check your faculty regulations. If you have a choice, it is more useful to your readers if it is near the front of the thesis.

### Table of contents

In a Table of Contents you should use roman numerals for all pages leading up to the Introduction. It does not matter where you put page numbers, unless your University requires them to be placed in a particular place. In the table of contents first list all those pages with Roman numerals, then go on to provide a comprehensive list of each chapter including all the headings and sub-headings with the relevant page numbers.

Provide lists of all tables, illustrations and appendices and indicate the page numbers for each one.

### The body of the thesis

Within the body of the thesis the Introduction will be based on your research proposal, taking into account the adaptations you have made along the way. This is where your reader learns what led you to undertake this research (not your personal path – but the literature and evidence of problems that led you to decide on the research), the objectives of the research and the hypotheses you will be testing. You can also use it to explain any circumstances that are peculiar to the situation you address or which made the research more or less difficult. Look at **Chapter 2.3** for input on hypotheses and objectives.

The literature review may be a separate chapter on its own, it may be only part of the introduction and part of the research methods chapter, or it could form more than one chapter and be part of other chapters. (See **Chapter 2.2** for more details on accessing and using literature).

Research methods and data presentation may be contained in one or more separate chapters. For some theses gathering the data is a major component of the contribution and presenting the data collected is an important component of your work. Refer to Parts 3 and 4 for information on how to present data, and on selecting the data presented. You need to be sure to provide an overview of which research methods are available and why you chose the particular method you did. You should also, show why you chose to collect those variables, the sites selected, time periods and any other important factors. Your examiners will be unimpressed if you just went out and collected everything that was available. An important part of the process is to know what to collect. You waste both your time and that of the communities involved in the data collection if you collect more than you need for your specific objectives and hypotheses.

The analytical techniques that are possible (with more detail on those used) can be put in front of the results in a chapter covering both analysis and results, or they can be in separate chapters. If your thesis is very involved in establishing effective models or in finding the best analytical techniques, then this may cover several chapters. If you are using a widely accepted methodology, then a simple introduction in front of the analysis and results chapter is fine.

In most cases it is best to present your results simply and clearly giving only a brief explanation of what they mean but without providing discussion and interpretation. However, for some research it may be appropriate to include some discussion with the results and they may be incorporated into several chapters leading to the overall conclusions.

The discussion of the results can be a separate section at the end of the presentation of the results or be in a chapter on their own. This discussion can be used particularly to provide input from your results to the different options relating to the problem and it is here that you would make recommendations arising from your research. Refer to **Chapter 5.2** for more detail on how to write up your results.

Your conclusion should not be too long. It should highlight your objectives and your hypotheses again and show how your thesis has addressed them. You should then summarise the discussion of the results, presenting them as implications and policy recommendations. For many theses, the most valuable contribution will come from your recommendations on areas for further research. This is a component that is often tagged on at the end with little thought. It should be given much more attention. You should not only indicate what needs to be done but, if you have the information, you should indicate how it should be done.

**Throughout your work you should keep making a note of where you are frustrated because you don't have access to certain information. Whenever a villager or anyone asks you what your research shows should happen with respect to x, and in fact there is more work that needs to be done for you to answer the question, then note it down. When you come to consider the areas for further research you then select from these notes those you consider the most important and most interesting.**

### References

Every thesis must include a comprehensive list of all the references cited in the text. Examiners are very particular about references because it is a hallmark of academic work that the reader is able to follow up on what is being presented. Every reference cited must be included and the references must be presented in the style required by your university. Refer to **Chapter 2.2** for more information on reference lists and bibliographies.

### Appendices and footnotes

Appendices and footnotes are very useful because they provide you with the opportunity to present information which may be of interest, but which, if included in the body of the text, would divert attention from the main topic. Appendices allow you to present information both as data and analyses which are relevant to the topic but outside the direct purpose of your research. However you should not simply include all the data you collected or all the analyses. You should only include information in an appendix if it is relevant to your thesis and if it would be useful to a reader. If you include too many appendices it will seem that you are unable to discern what is relevant. It may also make your thesis too heavy to carry!

Footnotes are very useful in providing some additional information but if you have too many of them then again it will appear that you are unable to select what is important, and they can also affect the readability of your work.

## Presentation and style

Modern technology has made it easy for work to be well presented. You need to ensure that you are consistent in the way you present headings, tables and other information. This consistency is also important in the use of fonts, bold, spacing, bullets and other format issues.

**You must follow the style required by your university for titles on tables, figures and illustrations; for headings and sub-headings and indentations.**

For a discussion of style you should refer to *Scientific Writing for Agricultural Research Scientists* by Stapleton *et al.*, the full text of which is available as **Appendix 5**, as are several more helpful appendices. You can also consult Greenfield (Chapter 37, 2002) and Levy (Chapters 38 and 39, 2002). There is no one acceptable style but in general a formal, impersonal style is normal for theses and dissertations. It is interesting to note that Greenfield (page 312) argues strongly for using the pronoun, 'I' and a more personal approach. Levy on the other hand argues for a more formal and impersonal style (page 319). This contradiction reflects the different schools of thought and highlights the need for you to make your own choices. These choices are constrained by the requirements of your university.

Before you start to finally write up your thesis, you should look up the regulations at your institution. You should format your chapters to match these requirements when you first start drafting your chapters. Your university will normally require you to present your thesis in a very specific way. It is useful to format your chapters correctly from the start. This will save you time. It can be very difficult to adjust your layout to new margins or to redo all the headings to meet university regulations.

Also check on your supervisor's preferences beforehand! You can ask your supervisor about format issues, but I suggest you read some of your supervisor's work (in fact the work of all the members of your advisory board if you have one) to be sure that you understand the style he or she prefers. You can choose to have a different style but then you should be prepared to defend it.

## Writing

### The approach you use

When you come to writing up your work it is important that you understand what underlies the logic of your arguments. You need to know where it is appropriate to rely on different approaches. Most theses will include an element of each of these approaches for different aspects, but one form of reasoning should provide the driving logic for the thesis and be the main focus for your 'guide book'.

- **Deductive reasoning** is where you derive your hypotheses from theory and is sometimes referred to as **conceptual reasoning**. It will be most applicable to theses where you are going from the general to the particular. This is the approach popularised by Karl Popper (1934, English version, 1977) for the social sciences and is normally followed by the testing of these hypotheses using historical analysis, literature reviews, and sometimes through case studies.
- **Inductive generalisations** are used when you go out and collect specific information (from samples) and then apply the results to a broader population. This is the most common method of testing hypotheses in the natural sciences. In order for the specific to be valid for generalisation to a population, the sample will have to be statistically valid.
- **Case studies** are useful in providing a fuller understanding of a particular situation but can seldom be extrapolated to a valid generalisation.
- **Retroductive reasoning** is a less-common research approach than deductive reasoning and is most relevant to developing and shaping theory. It is appropriate when the situation appears to be different from what we would expect theory to predict. It is where you gather

empirical data and then develop hypotheses (make inferences) based on the information collected.

In the writing of your thesis you need to be sure that everything you claim is justified so that anyone challenging your results cannot fault you on the logic of your approach but only challenge the data you may be using.

**Common fallacies of scientific reasoning** (derived from Mouton, 2001)

### Unsupported generalisations

Unsupported genrealisations present a very common trap and you need to be extra careful to avoid them – economists and other social scientists are particularly vulnerable. You must have evidence to support claims. Every time you state something is … check to see if you have included your basis for saying it is so! Try and avoid 'all' or 'every' unless you are sure there are no exceptions.

### Appeals based on authority

It is not always enough to claim that your evidence derives from the opinion of another 'expert'. If the source is internationally recognised as an expert you may get away with it. However it is better to get more than one source to support what you are saying or to use other evidence as well.

### Impressing by large numbers (bandwagon)

Remember that all numbers are relative and that you need to put the data into context. Even where statistical analysis bears out the results you would like, it is useful to put it into the context of findings of similar research elsewhere.

### Affirming the consequent (*post hoc* fallacy) otherwise known as illogical reasoning

You are probably aware of the requirements for statistical validity and may not fall into this trap but you need to be very careful when linking cause and effect. Just because when you harvested pearl millet, the clouds came over does not mean that millet-harvesting causes overcast conditions! If something appears illogical to you, then very carefully check how the researcher has linked cause and effect and what evidence they have for that link.

### False analogy

False analogies are most frequently found when making comparisons. Because some things are similar it doesn't follow that all are, for example, given that Mozambique and Zimbabwe are both African and both developing it does not necessarily follow that they are the same country.

### Circular reasoning

Circular reasoning happens when you try to prove a point by returning to the point itself.

### *Ad hominem* reasoning (attacking the person)

*Ad hominem* reasoning occurs when you attack the credibility of the person instead of addressing the issues and attacking the argument.

### *Non-sequitur* reasoning

This is where the reasoning is not logical and does not actually follow, e.g., it is a *non-sequitur* that: 'violence in films has a bad effect on children and so people should not see violent films.' The finding refers to children so you cannot make the conclusion for adults.

### Red herring argument

A red hering argument in what happens when you bring in a side issue with no real relevance

to your research. It only serves to distract the reader from looking for the proof that should be presented.

**Some tips on writing up**

Writing up your research is one of the most difficult tasks you will face. This is particularly true for those who are more used to practical work either in the field or the laboratory. It can also be the least-interesting aspect of the thesis because you now know what you found and it is tiresome to have to spend as much time writing it up for others as you spent in finding out the answers. You should avoid thinking in this way as it will affect how you write. Rather consider it an equal challenge to make what you know accessible; to prove to the world that you are capable. By making your work accessible you can make a difference to the world. If you do not take up this challenge then what you have found out will be as useful to the world as playing with a puzzle.

Another problem, even if you do see the written work as important, is that you may face writer's block. This is a problem almost all writer's face at one time or another. A suggestion is that you first give yourself a few days of total space to allow time for your subconscious to work. If that still doesn't help then just force yourself to write whatever it is as a letter to your grandparents or a cousin in the rural areas. In this way you make yourself simplify the problem and do not feel overwhelmed by the need to meet some outside standard. Once you have the basic concepts down, it is much easier to translate them into the more formal and detailed style required for your thesis. Try it – it really does work and it can help your thesis!

You also need to keep in mind that every person operates differently. For some it is important to stick to the routine of writing a certain number of pages each day regardless of how slowly. For others, the subconscious is always important and it may be necessary to give your mind time free from distractions that will then give you the chance to be much more productive when you do write. I am one of the latter and if I am producing original writing, I normally need time with no distractions pottering in my garden and reading light novels before I can really be effective. But such periods need some limits or they become simple indulgence.

Writing a thesis requires 'soul time'. You must recognise that you need to be able to dedicate all of yourself when you are writing your first draft. It is difficult to be creative and innovative and to really assess the implications of your results if you are not totally focussed on your research. You need to be aware of this and block out time completely away from other work and family duties in order to produce something really worthwhile. When you are feeling stressed or overworked, or when you have writer's block, then edit what you have already written. Design tables and figures and improve the style and presentation. These things allow your subconscious to continue to work and help you to overcome your block.

When you are in the process of writing, get up at frequent intervals – go for a short walk, stretch, or go and get a cup of tea. Avoid interaction with others so that when you come back and sit down you will find your mind has already arranged what you are going to say.

You need to be sure that you give yourself strict deadlines. With an MSc this is normally done for you and you are forced to complete. However for research degrees and doctorates, supervisors tend to leave you to determine your pace for yourself. There is a very real danger that if the project with which you are working finishes before you hand in your thesis, that you will never complete your degree. You really have to set yourself very strict deadlines and you cannot take on other consultancies or work, no matter how pressing your financial needs, if it means that you won't complete. You have to be very strict with yourself. If you leave your research for more than a year, rural development progresses so fast that you may find what you were working on has already been overtaken.

No matter how badly written it is imperative to produce a first draft promptly. It is much easier to rewrite and to see where you have gone wrong once you have it down on paper.

Another really important point is to remember that no matter how long you work on your research and on your thesis,

**it is NOT possible to produce the perfect research, and it is not possible for your research to solve all the problems.**

You have to draw the line and you have to accept that your work is not necessarily going to win a Nobel prize or transform rural areas or solve food security. Your work is only one imperfect step towards that goal. Provided it makes that step honestly and boldly and to the best of your ability, you can do no more.

After you have reviewed the literature in some depth and done your fieldwork and while you are in the labourious process of entering, or supervising the entry of your data, you should write your entire thesis. It will give you a needed break from entering numbers or working with your experiments. Before you have analysed the data and even before collecting all the data, write your thesis. In the results chapter you can put in what you think the results will be. It also helps to even outline the conclusion and fill in what you expect to find with respect to your hypotheses. This will assist when, almost inevitably, your results are different. You can then look for the explanations and see why the results differ from theory.

Although you will significantly change what you have written, even for the introduction, literature and methods chapters it will really help you to have the overall thesis structure in place. You will be writing it while you are living it, and this can also help you to chart a clearer course. You won't find when you get to the end that you have left out some vital component because by writing it first you will have identified what needs to be in place. Best of all, you can avoid the tension created when all the research is complete and you now have to write. This is advice that is seldom followed – but if you take it, you will find completing your postgraduate degree much more likely, and more fun.

## Resource material and references

**Appendix 1.** The Craft of Research. Paul L. Woomer.

**Appendix 5.** Stapleton, P., Youdeowei, A., Mukanyange, J. and van Houten, H. 1995. *Scientific Writing for Agricultural Research Scientists*. WARDA/CTA, Ede, The Netherlands.

**Appendix 6.** Publication as an Output of Science. Adipala Ekwamu.

**Appendix 7.** The Art and Ups and Downs of Scientific Publication. Adipala Ekwamu.

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# 5.2 Results, implications and dissemination

*Kay Muir-Leresche*

- **Separate results from interpretation**
- **Link your hypotheses to your results in the discussion**
- **Evaluate the meaning of your results**
- **Keep presentation simple concentrate on the main message**

*'You are the impisi that pieces together the assegais of our forefathers.'*
**Credo Mutwa**

*'I am a pilgrim of the future on the way back from a journey.'*
**Teilhard de Chardin**

In the previous chapter you learned how to go about writing up your thesis. This chapter will explore in a little more depth the issues of presenting your results and most importantly in sharing them more widely.

Your research results are the core of your thesis and your work. It is here that you need to present your findings in a way that both has meaning to your peers and is academically rigorous. At the same time it is very important for most work that is relevant to rural development to be understood by a broader audience. How do you achieve the requirements for obtaining your degree, which is your first goal, with your commitment to serving society and contributing to rural development? You do both. There is no reason to choose one over the other. The following guidelines will help you to present research results that are relevant for your thesis and can also be used when writing research reports and scientific papers. In the results chapter general trends in the data are summarised without comment, bias or interpretation. Leave the interpretation, relevance and links to your objectives and hypotheses to the chapter or section on discussion of results or policy implications. It is also important to make your results accessible to a broader audience.

## Presenting research results in theses, scientific papers and reports

The results section in academic research describes but does not interpret the major findings.

*'Report; don't discuss or interpret. Research results are matters of fact; interpretation fluctuates with perspective, opinion, and current knowledge. Reasoned speculation belongs in Discussion; important facts*

*and objective observations that are unambiguously true belong in the results section. In the Results section illustrate and summarise findings: organise data and emphasise trends and patterns with appropriate visuals. Integrate visuals with text: the text offers claims and general statements that the visual details support.'*

**Gilfoyl, undated**

The presentation could be chronological, to correspond with the Methods section and data collection, or in the order of most to least importance. You may not necessarily present all your results but it is important to be honest in your selection of the results to present. Your results should concentrate on general trends and differences that address your hypotheses and not on trivial details. Leave out irrelevant results and those that refer to an experiment or line of enquiry you are not pursuing i.e., those hypotheses you have decided not to include in the thesis, scientific paper or research report. Do not leave out results that are contrary to expectations in testing the hypotheses you are putting forward. You will gain recognition of these results if you can explain why you think they occurred (even if it was a problem in experimental design) and it will also provide legitimacy to your research if it is clear that you are being completely transparent in presenting all your results. Avoid manipulating the data and reporting the results in a way that is misleading e.g., 'one third of the fields were treated full strength; 1/3 half strength and the final 1/3 as a control' when in fact there were only three fields in the experiment!

Ensure that the results you do use are clearly presented. It is important to present the results both in writing and organised into tables, figures, graphs, photographs, models etc. as appropriate. Begin each paragraph with an opening sentence that tells the reader which question is being tested in the experiments described in that paragraph. Specific, succinct explanations of what the results represent and/or how they were obtained should follow. You do not interpret their meaning here, that is for the next chapter (section) but you need to clarify to readers what each result is. Any results that include multiple data points needed to evaluate the experiment should be shown in tables or figures. However, they should also be summarised in accompanying text. If there are only a few numerical results or a simple conclusion use the text rather than a table or graph. The text should be understandable by someone who has not seen your figures and tables. Unless there is a very good reason, data included in a table should not be duplicated in a figure or graph.For your thesis and whenever the data needs to be made available, the tables from which the graphs etc. are derived can be put into appendices. All figures and tables included in the body of your work should have descriptive titles and should include a legend or key explaining any symbols, abbreviations, or special methods used. Figures and tables should be numbered separately and should be referred to in the text by number. All columns and rows in tables and axes in figures should be labeled.

Figures and tables should be self-explanatory; that is, the reader should be able to understand them without referring to the text. They should summarise and not present large amounts of raw data and should provide some way of evaluating the or statistical significance of any numbers presented wherever possible.

## Discussion

This section should not be a restatement of the results but should emphasise interpretation of the data, relating them to existing theory and knowledge. This is the section where you can speculate and go outside the bounds of your results, provided you differentiate between supposition and empirical results. In writing this section, you should explain the logic that allows you to accept or reject your original hypotheses. You must be careful not to restate all your results but rather use this section to explain your interpretations and your conclusions and show how the data support your hypotheses and how they compare to the predicted results if you included those earlier in your thesis.

You need to highlight the most significant results, but avoid repeating what is in the Results section. You need to show how these results relate to the original question and that they are consistent with other investigations or if not, why not. This is where you show how your results fit into the known situation. You need to consider how your results compare to the expected results and you need to use your results to make predictions, to inform policy, or provide advice to practitioners. Trends that are not statistically significant can still be discussed if they are suggestive or interesting, but cannot be made the basis for conclusions as if they were significant.

The main purpose of this section is to evaluate the meaning of your results in terms of your objectives and to highlight their significance to agriculture, the environment and rural development.

Ensure that your Discussion section includes:

- The relationship between the results and the original hypothesis, i.e., whether they support the hypothesis, or cause it to be rejected or modified. If rejected is this the result of bias that may have affected the outcome?
- Your conclusions and the analysed evidence that leads to them
- An integration of your results with those of previous studies in order to arrive at explanations for the observed phenomena and fit them into the bigger picture
- The implications of your research for rural development including predictions, practical and policy recommendations when appropriate
- Posssible explanations for unexpected results and observations. These can then be phrased as hypotheses that can be realistically tested, which you should describe in the Areas for Further Research, including, where appropriate, how the method could be improved in future experiments
- A summary of the principal points you want readers to remember.

**Box 1. Results, implications and areas for further research**
**Management of cassava mosaic disease in Rwanda – Rose Njeru**

African cassava mosaic disease (CMD) is caused by geminiviruses and is the most devastating disease of cassava in the African continent. The viruses are transmitted by whiteflies (*Bemisia tabci*) and perpetuated by use of infected cuttings. In 2006, scientists from l'Institut des sciences agronomiques du Rwanda (ISAR) conducted a comprehensive survey to determine the distribution of the disease in the major cassava production areas of Rwanda. Survey results revealed that farmers have limited accurate information on the cause, spread and management of the disease. Consequently, the use of diseased cuttings is the major factor contributing to the spread of CMD. These findings were shared with cassava farmers in Eastern and South provinces of Rwanda. The feedback led to initiation of collaborative research between cassava farmers and ISAR scientists with a focus on enhancing farmers' skills in practical approaches for the management of CMD. Within one season, farmers became conversant with the cause and spread of CMD. In addition, disease control through use of improved resistant genotypes provided by ISAR, rouging and timely selection of clean planting materials are now clearly understood by the farmers. Clearly, articulating scientific results in a way that was meaningful to farmers was a key factor contributing to changes in farmer behaviour.

As farmers learned more about CMD, they also shared important local knowledge with us: **Over the years, they had observed that the popular cassava landrace exhibits low disease systemicity, thus most of the shoots on any diseased plant show no disease symptoms**. This is an important element of tolerance to CMD and recommendations to cut back the diseased shoots are being re-examined along with much more research into the properties of local landraces.

Introduced genotypes are resistant to CMD, but their responses vary from one location to another and their tuber qualities vary with soil conditions. These are direct issues arising from our initial research that we need to address. Through the established interaction, farmers have articulated their research demands and joint experimentation will be initiated in October 2007. It will focus on the identification of location-specific improved cassava genotypes for improved livelihoods as well as research into the opportunities for exploiting landraces for the management of CMD.

## Further research

Ideas for further research can be included in the Discussion chapter or in the Conclusions. Results were the core of your research, and unless you have significant results that make radical changes to policy or practice, the most meaningful outcome of your work may be those specific questions that arise from your work that can be addressed by further research. You need to be sure to give this serious consideration. Avoid simply indicating that the problem needs to be studied further. That is axiomatic – all agricultural, environmental, biological and even rural development issues need further research. You should clarify which specific aspects, highlighted by your findings, need further research. Indicate the disciplines and if possible even provide some tentative hypotheses, methods and approaches; suggest future experiments that might clarify areas of doubt in your results. Suggestions for the improvement of techniques or experimental design may also be included.

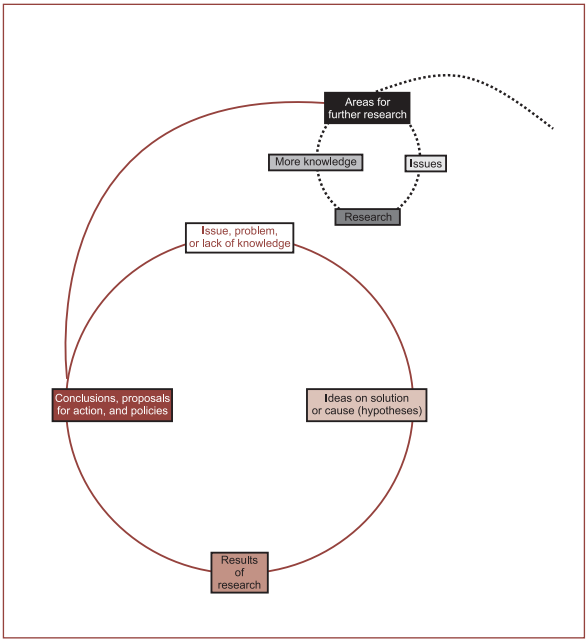

Figure 1. The cycle of research

Do not end your chapter with what you wish you had done in your research. Be positive and provide a clear statement of what you found and your contribution, even if the major outcome is where and how to take the research further.

## Presentations and communication

Even the greatest research findings mean very little unless they are effectively disseminated, communicated and used. Your thesis and degree should not be the only result of your efforts. You need to make your work available in academic seminars, journals and books for the benefit of your future career and to make your contribution to the advancement of science. Researchers from other disciplines might be interested in your research results and research methods and so you could repackage your papers and presentations in general journals in a way that would make them understandable to non-specialists. You could also make your research available on the internet by providing it on your Departmental website. Thus, in addition to your thesis you need to produce peer-reviewed journal articles and chapters in books, other publications such as Departmental working papers, policy notes and articles for the web. You also need to make presentations individually in academic seminars, workshops and conferences as well as some that may be made jointly with others in your team and which will address a broader audience.

But as someone engaging in action research and in rural development, you need to take the dissemination of your work much further. You need to find ways to make it available to the

communities in which you worked. If possible your research funding should cover a return field trip to discuss your results and their implications with the communities with whom you worked. If funding is limited, try to find a way to achieve this by working with extension agents or NGOs. Discussions with the communities will both enrich your interpretation in your thesis and help to make your research more meaningful. It is also important to make the work accessible to extension agents, NGOs and other technical people working on implementation in the field and if possible you should try to make it available to policymakers and even to the general public. There is a need to promote and increase the use of your research results among all potential users, varying from community members to donor agencies. The likelihood of research findings being used will increase if the following steps are taken:

1 Develop and use a systematic dissemination and communication strategy to reach different audiences of potential users.
2 Present the research results to all stakeholders and obtain feedback on findings and recommendations.
3 Develop a plan of action to promote the implementation of the recommendations that resulted from your study. This is particularly relevant if you are working in a funded project where dissemination is part of your responsibilities.

Include the mass media: newspapers, radio, TV, posters. These are effective in disseminating information to a wide range of audiences. Identify key contact persons in each news organisation, for example, reporters who cover the area of your research, and/or the news editor. You may approach them through an e-mail including relevant information about your project. Existing summaries of the study can be used, but it might be useful to elaborate on the problem so that the reason for the study can be fully understood by a lay person. You will find that community radios and newspapers are especially welcoming of such material and may even assist you. In addition to contributing to development, you will also be raising your profile and adding to your CV.

Modern technologies are evolving using web sites and CDs that allow much more flexibility in providing access to data, analysis and broad participation in research. These also allow for more effective research over both time and space. They reduce some of the costs of communicating and allow for non-linear access to the information as well as layered presentation of the information – so that it is presented for different audiences with simple intuitive and descriptive information in layers for the general public and deeper more specialised information as you reach further in. Hypertext is one example of software that can assist in this process and it is being used in research in the Andes to provide a more integrated research programme across different countries, disciplines and stakeholders in that region.

**Dissemination strategies**

The main objectives are to:

- Make maximum use of research findings to support agricultural development
- Meet the need of the research users to generate agricultural information and technology derived from research results
- Share experiences and to exchange research findings among scientists for the advancement of agricultural science and technology
- Provide current information to the extension personnel and educators to enable them to formulate extension and teaching materials to solve farm problems.

1 Publications are the normal channel for disseminating research results. They have the advantage of reaching a wide geographic spread and of contributing to on-going research efforts. Publications include:
   - Scientific publications as communication media between scientists and users

- Scientific reviews presenting research results on certain scientific disciplines, specific commodities, aspects of agricultural development and other subjects for policymakers, research managers and researchers
- Policy briefs written specifically to translate research findings into outputs that can inform policy
- Newsletters, presenting important research activities and findings in popular style for rapid use by extension personnel, practitioners and other users. These should, where possible be published in the local language
- Technical guides, presenting technical information on research results in manual form for direct utilisation by farmers and by extension agents, NGOs and local governments
- Proceedings of seminars, workshops, and other meetings discussing research activities and results
- Special publications such as leaflets, brochures, books, presenting certain aspects, progress, state of the art, etc. of the research activities and their results.

2 Various meetings such as seminars, symposia, workshops, and other meetings where research results are discussed. The main objective is to obtain input and feedback from the research users and to provide them with information on what is happening elsewhere.

3 Field-days and village meetings on research results, these offer the opportunity to discuss the relevance of research results with extension personnel, farmers, practitioners and other users and to enlist them in charting new directions to the work.

4 On-farm research and scaling up the findings. This could occur when you register for a doctorate, or if you stay on and work in an extension of the project, or as part of your post-doctoral research. You would then test the adaptability of certain research results in farmers' fields, particularly in terms of different physical as well as social environments. This scaling-up is also a form of dissemination – and often the most effective. A more comprehensive type of on-farm research could be conducted on a commercial scale (developmental research). On-farm research is implemented with the active participation of farmers and extension personnel who can benefit directly from tested and adapted new technologies and can contribute to the progress of the research.

5 Mass media. This can be an important tool to reach your target groups. The radio is particularly useful in many remote areas. Take the initiative; contact radio stations and you will be surprised at how open they are to having you present material on air. Radio can also be a useful stepping-stone in establishing your credibility and such presentations can be included in your curriculum vitae. If you are too shy to talk on the radio, then provide the media (radio and print) with copies of your information remembering it is often more attractive to them if it includes photographs. Invite the local TV station to attend some of your village meetings or field trips.

6 Electronically and digitally: videos, CDs, DVDs, the internet and even e-mail list-serves can play a very important role in getting your message across. Where your targets for dissemination (e.g., extension agents) have access to computers, the production of CDs is very much cheaper than printing. It can also be a good way to report back to the community if you can hire a DVD and TV, or project through a computer. This provides the community with good social and educational interaction and could provide positive input to ongoing work.

There are other ways to disseminate research results such as exchange visits between farmers/research sites, personal contacts between researchers and extension personnel and similar activities.

We need to increase the frequency and quality of interaction with key government policymakers. You need a succinct and clear outline of your main findings and their implications. It is important that research reports for policymakers contain some indication of

the implications for employment and the environment and it is essential that the economic costs and benefits at both the farm and regional or national level of these results are made clear. To enhance the market-responsiveness of the agricultural research system increased linkages between the private sector and scientists are also needed. You cannot be solving real problems unless you are out there experiencing the real world. It helps if your institution works in some collaborative projects with the private sector.

**The principal means of dissemination: some advice from experience**

A few key pointers are given here for the main tools of disseminating your work but you are advised to consult the references and search the internet for more comprehensive guidance.

### Journal Articles and Scientific Papers and Books

What has been written about presenting your results and writing your thesis is also applicable to journals and books. A scientific paper is a written report describing original research results. The format of a scientific paper has been defined by centuries of developing tradition, editorial practice, scientific ethics and the interplay with printing and publishing services. A scientific paper, like a thesis, should have a Title, Abstract, Introduction, Materials and Methods, Results, and Discussion. For a paper, the Discussion is usually where most of your emphasis should be placed unless your research is aimed at new analytical approaches or research methods. You need to be sure to obtain the particular guidelines for the journal or symposium to which you will be submitting your papers. Each one has a different style for references and layout that you much follow exactly. You will also get a better understanding about which journals are better suited to your particular research focus if you peruse back copies.

Every paper should inform the reader which issues they are addressing, how they did their research, what data were collected, what the data mean and what conclusions can be drawn from the research. In addition for action or rural development research you need to focus on the implication of these research results for farmers, extension agents or policymakers.

You should take advantage of your graduate research to publish papers. These will establish your credibility and contribute to the knowledge base. For many career academics, the publications from their graduate research form the core of their publication record and you undermine your chances of remaining in academia if you do not publish. Furthermore if your research remains locked in your thesis, very few people will have access to it.

### Oral presentations

In oral presentations of any kind; whether papers presented at conferences or at village meetings, your presentation must have a key message. You need to leave your audience in absolutely no doubt about what you came to tell them. You should provide your key message within the first 15 seconds of starting your talk. Research shows that if you don't do this you risk losing the attention of your audience. You need to invest time on thinking through your key message so that if nobody listens to you after those opening 20 seconds they will still have understood what you really want them to know. The remainder of your talk will fill in the detail and prove your point to those who are interested. You need to repeat the key message in a different way at the end of your presentation. It will help if you can assess the audience during your presentation and then rephrase your key message in a way that is directly relevant to them.

You need to remember that oral communication is different from written. Listeners have one chance to hear your talk and can't ‘re-read’ when they get confused. In many situations, especially at conferences, they will hear many talks on the same day. Being clear is particularly important if the audience can't ask questions during the talk. To help you be clear and concise: KISS (keep it simple stupid). Focus on getting one to three key points across. Or alternatively repeat: tell your audience what you're going to say (Forecast), tell them, and then tell them what

you told them (Summary). Leave them with a clear picture of the gist of your contribution, and make them want to read your paper. Your presentation should not replace your paper, but rather entice them to go and read it.

Most audiences should be addressed in layers: some are experts in your sub-area, some are experts in the general area, and others know little or nothing and are from other disciplines or international agencies. You need to know which segment is the most important to you and to pitch your presentation to that level while providing some information relevant to each level.

A suggested outline for a 30–40 minute presentation at a conference is adapted here from Hill (1997).

- **Title/author/affiliation** (1 slide) But ONLY if it is not already in the proceedings. If it is in the proceedings then SKIP this slide
- **Forecast** (1 slide)
  Give gist of problem attacked and insight found. (What is the one idea you want people to leave with? This is the 'abstract' of an oral presentation)
- **Background**
  - **Motivation and problem statement** (1-2 slides)
    (Why should anyone care? Most researchers overestimate how much the audience knows about the problem they are attacking. This is a very important part of the presentation)
  - **Related work or Literature review** (0-1 slides)
    Cover superficially or omit (Just refer people to your paper)
  - **Methods** (1 slide)
    Cover quickly (especially in short talks rather refer people to your paper for detail)
- **Results** (4-6 slides)
  Present key results and key insights.
  This is the main body of the talk. How you present this depends very much on what you are presenting but it should not include all your results. Only those that are of direct interest to the points you are making. Refer readers to your thesis/paper for more results. Avoid just presenting numbers, they need to be interpreted and you should not present large tables of numbers. Graphs are better for presentations
  **Summary of results** (1 slide – if a summary is needed)
- **Implications for: rural development, the audience, and future work** (1-2 slides).

Appearances are important when making presentations and you should ensure that all your slides are clearly presented with spelling and punctuation carefully checked. Do not try and cram too much on one slide. Rather have more slides because too much information is confusing. Use only a few key words and phrases – be concise. You need to be sure that what is on the slides is large and clear to those in the back of the room. It is more interesting for your readers if you include pictures and diagrams to illustrate your points. Take care to use only colours that are easily read from a distance.

**The most important** thing when making a presentation is to ensure that you **do not read** what you have written on the slide. The Powerpoint should be just to provide listeners with a few key points and with illustrations. If you want the audience to know exactly what you have said in your paper – then provide them with a copy after the talk and advise them beforehand that they will receive it. Do not distribute before you speak, they will sit and read it, and rustle the pages! You both bore and insult your audience if you read to them what they can read for themselves. When you are making an oral presentation it is really important to make eye contact with your audience; to find things that make what you are saying interesting and to challenge the audience. Try to ask them rhetorical questions and pause before you answer. Get them engaged and not just passive. Do not be concerned if you do not cover everything you intended to cover. Provided you make the few key points interesting and memorable you will

have succeeded. Anyone who needs more information can come to you to get copies of your paper or even your thesis. The most interesting presentations are those where the speaker talks informally and without notes. If you can not do that, then be sure that you use your notes only to prompt you. It is also a mistake to try and learn the entire talk by heart unless you are a skilled actor. Be comfortable with your key points and know what you want to say. Then relax; pretend you are talking around a fire to your grandparents and explain to them what is exciting about your research. You will be surprised how effective that can be. You should also always aim to make your presentation short enough to include questions, since the best part of a presentation is usually the dialogue.

### Posters

A poster is simply a static, visual medium (usually of paper and board but increasingly electronic) that you use to communicate ideas and messages. The difference between a poster and an oral presentation is that you should let your poster do most of the 'talking'. The material presented should succinctly present the essence of your message. However, that does not mean that you can disappear to the pub! Your task as the presenter is to answer questions and provide further details; to bask in praises or suffer difficult questions; and to convince others that what you have done is excellent and worthwhile (see Tham, 2001).

A poster normally includes the same information as oral presentations and journal articles but may be presented slightly differently. You need a Title and research team details with the Summary giving what you set out to do, how you did it, the main results and key findings/implications. How much you include in the rest of the poster will depend on the space you have been given, but you do need to highlight your hypotheses, refer to the data collection and analytical methods and then relate your results to the hypotheses and provide information on the implications and possibly the areas for further research. It is important to select only the most important highlights from your research. Plan what you are going to say and think about the what, how and why of the work you did. Critically examine your approach and your results and also examine the purpose of the poster.

- What are you trying to achieve by presenting the poster? Is it to sell a product? Is it to tell people what you have done? Is it to tell people of a new discovery? Is it to convince people that one product or technique is better than another?
- Who will be attending the presentation? Are they technical people? Are they potential funders for further research? Are they beneficiaries? What is the level of their knowledge of your subject area?

Then try to make the poster so that it achieves your aims and reaches the target audience. It is important to be concise, to have interest on your poster with illustrations, pictures, diagrams, graphs etc., but to ensure that you do not distract from your main message.

**Box 2. Dissemination of your work**
**Rose Njeru**

In 2006, scientists from l'Institut des sciences agronomiques du Rwanda (ISAR) conducted a comprehensive survey to determine the distribution of viruses which infect sweet potato in Rwanda. Results showed that Sweet potato feathery mottle potyvirus, Sweet potato chlorotic stunt virus, Sweet potato mild mottle virus, Sweet potato chlorotic fleck virus and Sweet potato latent virus all infect the crop. Four of these viruses have a wide distribution and are possibly responsible for the declining yield of sweet potato in Rwanda. New knowledge is important and needs to be shared with different actors in the sweet potato sub-sector as well as internationally with the academic research community. In addition to workshops and

field days and other oral presentations, this information has been packaged for different clients and disseminated as follows:

1 Njeru, R.W., Bagabe, M. C., Nkezabahizi, D., Kayiranga, D., Kajuga, J., Butare, L. and Ndirigue, J. Viruses infecting sweet potato in Rwanda: Occurrence and distribution (submitted to: *Annals of Applied Biology*, 2007).
2 Njeru, R.W., Bagabe, M. C., Nsabimana, J., Ndirigue, J., Butare, L., Kajuga, J. and Nshimiyimana, J. Farmers knowledge on the management of sweet potato virus disease in Rwanda (Paper presented at African Regional Meeting on Women in Science for Food and Nutritional Security in Africa, Entebbe, Uganda, 3-7 July 2006).
3 Njeru, R.W., Bagabe, M. C., Kayiranga,D., Nsabimana, J., Ndirigue, J., Kajuga, J. and Nshimiyimana, J. Management of biotic constraints to sweet potato production for enhanced food security in Rwanda. (Paper presented at Regional Conference on Agricultural Research Outputs held at Serena Hotel, Kigali, Rwanda, 25-29 March 2007).

Extension materials/Brochures in English and the local language (Kinyarwanda)
4 Njeru *et al*. 2007. Enhancing food security through management of sweet potato virus disease and
5 Njeru *et al*. 2007 Kwihaza mu biribwa harwanywa indwara z'ibijumba ziterwa na virusi.

**How to reach farmers, policymakers and rural development practitioners**

The effort expended on interacting with community members and the efforts made to disseminate your work widely are being increasingly recognised. Donor agencies will take this into account when deciding whether to fund research projects; potential employers will consider this experience seriously; and even in academic circles there is increasing recognition given to the relevance of action research and teaching and to outreach. This means that in addition to contributing to improving livelihoods and conditions in rural areas, the efforts you make to disseminate your work more widely will be important to your career.

Information and the personal and technical skills (empowerment) acquired in participating in research projects combined with the opportunity to discuss research results and findings allow farmers to make use of new farming knowledge and technologies. Research shows that informal education and non-formal training, exposure and dialogue have a substantial effect on agricultural productivity. This can best be achieved by the effective use of communication technologies, including the new information and communication technologies (ICTs) that are being made more accessible through centres in some rural areas. Students and change agents need to take advantage of any such centres and assist them in providing information.

Failure of research to make a difference can be attributed largely to ineffective communication methods and the inappropriate content of the messages, which often ignore the specific cultural context of the research findings and do not look for ways to adapt them. Your communication strategy also needs to segment your audience by adopting some of the strategies of social marketing specialists to divide a community into various groups with similar interests in relation to the intervention/behaviour under consideration. Then the benefits of the proposed intervention most relevant to each interest group are identified, together with those aspects that adversely affect a group (so called 'resistance points'). Each sector of the population is thus treated according to its members' characteristics, needs, wants and predisposition. Selecting the channels of communication to deliver a message is the third step. Combined use of interpersonal communication and mass media is often synergistic and can help in the attainment of different objectives. Policy briefs, workshops, e-mail lists, websites, radio interviews, stories and dramatisation of your research, community newspapers, farmer

magazines, leaflets distributed with inputs or at trading stores, field days, working with NGOs and providing services to villagers, village meetings, meetings with traditional authorities, technical service agencies, politicians are all important in your efforts to be sure that your research results in action. Take up the challenge to make a difference.

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# 5.3 Where to from here?

*Kay Muir-Leresche*

- **The more people able and determined to contribute to sustainable development the better**
- **Your individual ideas and actions do count. You can make a difference**
- **Creativity and adaptability are essential for successful economies in a rapidly changing and global environment**
- **You can contribute to both the poor and to your own advancement with imagination**
- **Experience and a track record are important for getting jobs – you may need to start off in a menial position or doing voluntary work to establish your credentials**
- **It is possible to be an entrepreneur even without capital**
- **Blend modern and traditional, indigenous and conventional**
- **Be proud of your heritage, understand your limitations and grasp the opportunities**

*'…the initiation of all wise and noble things comes…,generally at first from some one individual.'*

**John Stuart Mill**
Representative Government

*'…there will be no injustice in compelling the philosophers who grow up in our state to have a care for the others.'*

**Plato**
The Republic VII

## Where to from here?

You have finished your thesis, you have had it examined and you have undertaken your corrections – it is bound and you have a copy which you proudly present to your family.

## What now?

Remember when you started out how unsure you were – 'How will I ever manage that?', you thought? Well you have – and you have grown in the process. You have developed skills and most important of all, you have gained confidence. After the strain of producing your thesis, you may be feeling a bit flat and uninspired. You probably need to renew your enthusiasm and burning desire to contribute.

**Confidence, the ability to use your own initiative and the inspiration and determination to make a difference, are the most valuable of all resources any country can have.**

The more people there are determined and able to contribute to sustainable development, the better. You only have to look around Africa, or the world, to see that it is not necessarily rich mineral resources, nor rich agricultural land, nor rich coastal waters that make countries better able to provide for their poor. It is their human capital. It is their commitment to success and their ability to respond quickly – to be creative and adaptable – so that they can take advantage of changing technology, institutions and social relations. It is essential for

us to start to take charge of our destiny; to succeed in developing our countries. We Africans want our children to grow up in an environment where they are able to chart their own course and do not feel hopeless. We need to be able to move away from corrupt practices that obtain short-term advantages. We need to earn our incomes by providing goods and services which in turn will develop Africa. We need to be able to take control of our development at the personal, village, national, and regional levels.

Finding work that provides you with money and prestige are common goals. They are important. We need that money to live, to repay our families who invested in our education and to provide for our futures. Social standing can be important to many people – but remember that fashions change and what is prestigious today may not be in 10 years' time. Happiness, however, is not limited to wealth and fame. There is considerable personal satisfaction from contributing to society. If you can make a lasting difference to the lives of the poor, to the development of your country, or even to one student or one farmer or one village, you will be able to look back when you are 80 and say – Yes, I did make a difference!!

These goals do not have to be mutually exclusive.

**Example 1**

Nyasha is hired by Norsk Agricultural Chemical Co. to promote the sale of fertilizers and pesticides. She earns her salary by selling to conventional markets and using the established recommendations. Perhaps she remembers that when she was doing her graduate research, many small-scale farmers could not afford to apply fertilizer at the recommended rate. She has heard of someone who has adapted the established recommendations to more closely suit small-scale, poor farmers. So in her spare time, she contacts them and then draws up a marketing strategy that would provide farmers with access to this new information. She has to persuade the company that, although these recommendations are for lower fertilizer use, they will make it possible to sell to many more farmers. In this example the sales agent used her initiative and commitment to change things for the better. She also advanced her career. You can all do this. In every job you do, it is possible to make the world a little better for the future. You need to believe in your own power. You need to learn to be a self-starter and to be prepared to put in that extra effort. You need to take an ethical stand. Do not allow your valuable skills to be used to further corruption and the cheating of your fellow citizens. Do not contribute to the degradation of the environment and the impoverishment of future generations. We owe it to our children to leave a better world than we found, and you can make a difference.

## Employment

### The formal sector

Remember that employment does not necessarily mean working for someone in return for a salary. Employment means using your skills and labour to produce output that will have financial and other rewards. Professional jobs for new graduates in Africa have become increasingly difficult to find, despite the considerable shortage of skills. This is because for some 50 years, governments employed new graduates. They would obtain practical experience and learn to operate in the working world that gave them credibility and led to formal employment in the private sector. Decentralisation, declining government budgets and reduced investment in research, extension, and education have all contributed to shrinking these opportunities in most African countries. At the same time, the private sector is reluctant to hire untested graduates. In most countries very strict legislation makes it difficult for employers to release staff once they have been hired and as a result they are very risk-averse in their employment policies. You are required to be much more innovative than your parents in seeking employment.

You need to get together some evidence of your ability. Take a copy of your thesis and of a few other projects or papers you have produced. Ensure that you include the extra-curricula activities with which you have been involved and any positions of leadership or trust which you may have held. Speak to the people you are going to use as referees and be sure they are happy to do this. Provide them with a copy of your CV so that it is easier for them to write the reference.

Find out about the company before you go for an interview. See where you think you would fit in. At the interview you should not be arrogant but you must make an opportunity to be able to tell them how you think you could contribute to their organisation. For example, if the job involves selling tractors, you might mention contacts from your home area who may be interested clients – or mention your experience working in a garage during one of your vacations. If it is project management and budgeting, you could mention your role in the university agricultural student society. If you don't have anything specific you could offer, at least be sure you understand what the organisation does and show that you have thought through how you could play a role within it.

**Something else**

If you are unsuccessful in obtaining formal sector employment, you should seriously consider voluntary service as a stepping stone. Most prospective employers would be prepared to provide you with basic transport and food costs. If you cannot find a company to hire you even on these terms, then prepare a research proposal and contact relevant NGOs, government research departments or even churches. Do not be ambitious for a high financial reward even when you are contacting an international agency. Remember this first 'job' is more to establish your credibility and gain experience than to provide an income. Impress the prospective benefactor with the fact that you are prepared to sacrifice in order to get ahead in the future and to contribute to your society. You need to realise that the world does not owe you a living and that you have to be creative in getting that first job. Once you have experience, if you prove yourself, it will be much easier to move up the ladder.

For many African students this is difficult. Their families have invested resources in the graduate's education and now they expect that person to start to contribute to the family. Prepare your family. Show them your strategy ahead of time and I am sure you will find them much more understanding.

Even if no-one is prepared to take you on, even as a volunteer, you may then have to go and take a much more menial job. Look at it positively as a stepping stone and be constantly on the look-out for how you can contribute to the success of the organisation for whom you are working. It is surprising how many highly successful people have started in very menial positions.

Increasingly in Africa the best way to get ahead is to become an entrepreneur yourself. How you go about this will depend on the contacts and resources you have. If you are able to raise capital then you can be more adventurous. If you cannot raise any capital then start very small. Identify a need and provide for it even in a very small way.

**Example 2**

Tapiwa realised that there would be no bread available in the following year. He knew that urban workers would need to have convenience food that they could afford. He went to his aunt in the rural areas and asked her to provide him with some sweet potatoes and promised to repay them when he harvested his own crop. He went and read up all the literature on sweet potatoes and learned what he could about their preferred soil types, mineral requirements and the most ideal moisture conditions. He could not afford fertilizer but he approached the people in his street and asked them if they would put all their vegetables and other wet refuse into

bags for him. He would collect it and this would reduce the unpleasantness of such refuse left out on the road for days. He also collected newspapers and on a vacant lot he made a compost pit. As a result he had a bumper harvest of high-quality sweet potatoes that fetched a high price because of the need he had identified. In due course he became a successful market gardener, bought his own plot and was able to employ workers.

**Agricultural research and our commitment to sustainable development**

Most of students with post-graduate degrees will eventually go into work that involves research. The ultimate goal of research is to search for the truth. Thus, we make a moral commitment when we undertake research and we need to honour that. We must avoid any fabrication or falsification of information and data. We must be sure that we set the highest standards for ourselves and that we maintain our integrity. This will require our research to be as objective as possible. It will mean that we need to closely supervise the collection and entry of our data. Most important of all, we must remember that the work we produce will be used to affect the lives of people who live at the margin. A small error can tip them into very serious poverty or even starvation. At the same time we need to respect their abilities, their privacy and their needs. We need to listen to them and to try to establish research, policies, and implementation strategies that empower the disadvantaged. The results may be slower but they will be more sustainable. We need to find ways in which we can adapt some of the modern technologies so that they can be used despite the constraints facing the users. We need to adapt traditional norms and values so that they can accommodate new technology. There is much scope for blending modern and traditional, conventional and indigenous and of finding ways to commercialise, improve and extend the use of traditional commodities. We need to find better ways to use our resources so that we do not endanger our environment. Be proud of your heritage, understand the limitations but grasp the new opportunities. Graduates must take a pride in creativity and in their ability to make something different by using both the old and the new. Technology is changing constantly and global competitiveness requires the ability to innovate rapidly (Porter and van der Linde, 1996).

## Resource material and references

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