Inter- and Transdisciplinary Research Methods in Rural Transformation
Case studies in Northern Ethiopia

Edited by Birgit Habermann (CDR/BOKU)

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TABLE OF CONTENTS

1 Inter and Transdisciplinary Research Methods: Relevance to rural transformation in Ethiopia

Yigzaw Dessalegn

1.1 Introduction

Poverty, natural resources degradation, food insecurity, resource share disparity, low farm productivity, farmland size reduction, loss of biodiversity, drought, migration, and conflicts triggered by population growth, climate change, and lack of employment opportunity are some of the problems encountered by community members in the watersheds of the TRANSACT project (Zerfu *et al.* 2011, unpub.). These problems have received due attention by responsible government organizations as well as a number of non-governmental organizations. For example, the government of Ethiopia as well as many non-governmental organizations have been constructing soil conservation structures and planting trees every year in all parts of the country mainly by mobilizing community members. However, the achievement obtained so far is far below the expected as well as in no relation to the effort made.

Food insecurity is a top priority agenda for the government of Ethiopia. The government has set up agricultural extension service provider offices from national to the peasant association level, farmer training centres at all *kebeles* or peasant associations[1], and research centres at different agro-ecologies to boost agricultural productivity and curb this problem. It has also deployed large amount of financial and manpower resources to this sector. However, until recently the problem of food insecurity in the country has been serious and farmers' adoption of improved technologies and extension advices has been very limited. Similarly, the government tried to solve the problem of landlessness, land shortage, resource conflicts and poverty through regulating population growth by family planning services on willingness basis; expansion of education service; and creating employment opportunities in the urban areas. However, employment opportunities created so far do not meet the demand of the population. Similarly, many university graduates remain job seekers rather than job creators. Moreover, the government's and the people's efforts have been further challenged by climate change, market liberalization, globalization, rapid urbanization, and world food, financial and fuel crises.

It seems that the root cause for the setbacks of the efforts lies in the approaches followed to solve these problems. For example, the problem of land degradation was addressed by constructing soil and water conservation structures and planting trees only. Similarly, food insecurity problems were addressed by boosting crop production through extension service and use of improved crop production technologies. These examples show the limitations of the attempts. Linear and disciplinary thinking avoided looking at problems from different perspectives, angles or directions. Neither did it take into account the knowledges[2] and skills of

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[1] The smallest administrative unit in Ethiopia.
[2] Using "knowledges" in plural indicates a respect for the diversity of knowledge. Compare also Powell 2006, Habermann 2013, Leach *et al*. 2005 and others.

the communities as well as their socio-economic diversity. Generally, the approaches followed were expert-lead and tailored to one discipline each. However, experiences from other countries have shown that inter and transdisciplinary research approaches can yield more promising and more sustainable results.

In Ethiopia higher learning institutions according to Getachew *et al.* (2011, unpub.) have not been providing training courses on inter- and transdisciplinary research approaches until now. As a result, researchers, lecturers as well as development workers lack knowledge and skill on these research methods. They have not applied these methods in both research and development interventions (Getachew *et al.* 2011, unpub.). In addition, there is very few published material about these methods available in Ethiopia, especially not regarding methods adapted to the Ethiopian context. Therefore, this manual is prepared with the following objectives and for the following target groups.

1.1.1   Objectives and target groups of the manual

This manual offers a compilation of information on the advantages and disadvantages of inter- and transdisciplinary research methods. It also offers basic information on research methods to students for implementation in their future careers. Researchers will also find suggestions for the application and procedures for inter- and transdisciplinary research, as well as in which areas it can be applied, and which challenges and limitations are to be expected based on the learning experiences the authors have collected in the TRANSACT project.

- To assist **policy makers, government and non-government development workers** in enabling rural people to realise their opportunities.
- To enable **students and researchers** to select and apply inter- and transdisciplinary research methods.
- To provide the means for **strategic planners** to analyse situations, identify challenges and opportunities together with all concerned stakeholders, considering different perspectives, at holistic or system level or by looking at different scenarios.

1.1.2   How to use this manual

This manual has two parts: the introduction which contains basic information about inter- and transdisciplinarity and their importance to addressing societal issues, as well as their advantages as compared to other research methods. Therefore, this introductory part has been prepared mainly for higher officials, development workers as well as interested university students. The second part of the manual starts with a review of procedures of engagement in the TRANSACT project. It revisits some activities and critically reflects on the experiences made in these activities. Finally, it looks at Scenario Planning and the specific methods applied and experiences made in TRANSACT as an example for an inter- and transdisciplinary method. This part of the manual has been prepared for university lecturers and researchers to serve as a guideline for applying such research methods in practice. Since it provides tools and procedures in order to effectively assist communities in developing their capacities, the second section of this manual is also vital for experts working in strategic planning.

1.2   From disciplinary to transdisciplinary research

As applied oriented research increasingly questioned the monopoly of disciplinary research, a plethora of different ways of overcoming disciplinary biases have been developed and continue to co-exist. These are defined as disciplinary, multidisciplinary, interdisciplinary, and transdisciplinary research. This distinction is partly based on the number of disciplines involved while implementing the research, and partly on the nature of the actual research carried out and the people involved in it. Each has its own merits and demerits.

1.2.1   Disciplinary research

Disciplinary research is carried out within the boundary of a single academic discipline, and it is executed by individuals or group of experts from the same discipline. Each research activity is designed to answer a specific research question and to follow the principle of a sequential or single-track problem solving approach (Tress *et al.* 2006). "*As a result, disciplinary research limits the potential variety of scientific and local knowledges that can contribute to our understanding of the issues at hand and the generation of new knowledges*" (Miller *et al.* 2008: 3). However, disciplines are the base for multidisciplinary, interdisciplinary and transdisciplinary research and provide essential building blocks for creating new knowledges in inter- and transdisciplinary research approaches.

1.2.2   Multidisciplinary research

"*Multidisciplinary research activities involve several different academic disciplines working on one theme or problem but with multiple disciplinary goals*" (Tress *et al*. 2006: 15), and "p*articipants exchange knowledge, but do not aim to cross subject boundaries to create new knowledge and theory"* (Tress *et al.* 2006: 15). The research of disciplines progresses in parallel without integration but usually with the aim to compare results (Tress *et al.* 2006). Miller *et al.* (2008: 3) described "*that in multidisciplinary research, individual researchers work on a common set of issues, but maintain disciplinary boundaries at the expense of meaningful integration with researchers from different backgrounds*". Similarly, Anandajayasekeram *et al*. (2009) defined multidisciplinary research as a research conducted by experts from several scientific disciplines, without implying that continual interaction and negotiation between these disciplines is necessary (as opposed to interdisciplinary research). In multidisciplinary research researchers remain within their own epistemological perspective and *"seek to acquire and validate knowledge within that epistemology*" (Miller *et al.* 2008:3). Individual researchers remain focused on the object of study, and rarely recognise complex relationships within the overall larger system of their study: rather than integrating the different components, it becomes more of a "*stapling together*" (Miller *et al.* 2008:3).

1.2.3   Interdisciplinary research

Interdisciplinary research refers to a form of coordinated and integration-oriented collaboration between researchers from different disciplines (Pohl and Hirsch Hadorn 2007). Similarly, Repok (2008) defined interdisciplinary research as a mode of research implemented by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a

single discipline or area of research practice. "*Therefore, in an interdisciplinary research approach, researchers are required to look beyond their own discipline, and work with the other relevant disciplines to find areas of overlap that are likely to yield new understanding*" (Bammer 2005:14). Therefore, unlike disciplinary and multidisciplinary research, interdisciplinary research incorporates a greater degree of integration such as unified problem "*formulation, sharing of methods, and perhaps the creation of new questions*" (Eigenbrode *et al*. 2007: 56).

Repok (2008) described interdisciplinary research as heuristic, iterative and reflexive. Heuristic because interdisciplinary researchers are discoverers: they use experimentation to achieve an integrated understanding of a particular issue. It is also considered as iterative since the research process involves repetition: with each sequence the researcher is coming closer to the desired outcome. And it is reflexive: researchers throughout the research process have to be self-conscious of disciplinary or personal biases. (Repok 2008)

1.2.4   Transdisciplinary research

Transdisciplinary research integrates academic researchers from different disciplines and non-academic participants[3] to research for a common goal and create new knowledges and theories (Trees *et al.* 2006). Mollinga (2010) defined transdisciplinary research as interdisciplinary research with interested groups (stakeholders) involved in all phases of the research.

Transdisciplinary research tries to grasp the complexity of problems; to take into account the diversity of life-worlds and scientific perceptions of "*problems, to link abstract and case specific knowledge*" (Pohl and Hirsch Hadorn 2007:111) and to develop knowledge and practices that promote what is perceived to be the common good (Pohl and Hirsch Hadorn2007). It is needed when knowledge about the problem "*is uncertain, when the concrete nature of problems is disputed, and when there is a great deal at stake for those concerned by problems and involved in dealing with them*" (Pohl and Hirsch Hadorn 2008:9). All participants provide a different perspective, complementing each other and resulting in a more complete description of knowledge than any single person could do alone. In addition, transdisciplinary research enables members from the community to share a set of values that influences and enables the production of knowledge (Miller *et al*. 2008). Smith (2007) described transdisciplinary research with the following four major features:

1. *Reaching beyond disciplines:* Transdisciplinary research leads to the use of a common research framework based on the contributions of the multiple perspectives present among participants. In the process of their cooperation, the researchers familiarise themselves with the approaches, concepts and theories used by other participating disciplines.

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[3] Academic and non-academic stakeholders, researchers and lay people, are working together in transdisciplinary research. To adequately represent this we will call the actors involved in this type of research "participants", to emphasise their active role in the research process.

2. *Reaching out to other stakeholders*: The collaboration in transdisciplinary research goes beyond research, and it involves also other non-academic groups who have a stake in the issue at hand.

3. *Action-oriented*: For this type of research academic and non-academic team members form a research team together. Jointly they are looking for solutions that are useful for the society, effective and sustainable (Balsiger 2004 in Smith 2007)

4. *Dynamic and reflexive*: Transdisciplinary research is dynamic, the flow between knowledge production and practical applications is permanent. Equally the groups engaging in the process can change and are not constant (Gibbons *et al*. 1994a in Smith 2007).

1.3 Advantages & challenges of inter- & transdisciplinary research

1.3.1 Interdisciplinarity

1.3.1.1 Advantages of interdisciplinary research

Interdisciplinary research has a number of advantages compared to disciplinary and multidisciplinary research approaches. Some of its prominent advantages are listed below:

- "*Interdisciplinary research incorporates a greater degree of integration than multidisciplinary and disciplinary research methods*" (Miller *et al.* 2008:3). Therefore, it helps to solve complex problems of the society and to generate new knowledge.
- Interdisciplinary research encourages unified problem formulation and sharing of methods of different disciplines. Therefore, it helps to show how different disciplines see and try to address a particular problem differently.
- Interdisciplinary research approach analyses problems from different perspectives. Therefore, it helps to understand the complex nature of the World.
- Interdisciplinary research allows researchers freedom from disciplinary boundaries or constraints. It provides freedom to researchers to explore any theory or method or phenomenon the researcher thinks appropriate.

1.3.1.2 Challenges of interdisciplinary research

Interdisciplinary research is considered as effective tool for brining solutions to contemporary complex societal problems. However, working across disciplines is also challenging. Repok (2008) states that interdisciplinary research faces challenges associated to disciplinary bias, i.e. using terminology that connects the subject to a particular discipline. Doing so limits the scope of research to a particular disciplinary approach that prioritises certain methodologies over others. However, interdisciplinary research must be open to different perspectives and approaches. (Repok 2008)

Morse *et al.* (2007:2) categorized "*bridges and barriers*" while conducting interdisciplinary research into individual, disciplinary, and programmatic. The authors list several *individual barriers*: preference for disciplinary work and individual disciplinary projects; focus on disciplinary mechanics and lack of creativity; lack of will and ability to think in terms of other disciplines; technical aspects such as preference for individual work over team projects, and fear

of addressing team issues openly. Similarly, Morse *et al.* (2007) have identified *disciplinary challenges*: the use of disciplinary jargons or technical terms as well as certain paradigms not understood by others; challenges relating to the use of variables, processes, units and standards; issues of timing such as differences in seasonality of data gathering; diversity in systems, policies, programmes, themes and audiences. Finally, Morse *et al.* (2007) also list *programmatic barriers* to integrated interdisciplinary research such as lack of focus for team guidance; the small attention given to interdisciplinary projects as compared to disciplinary ones; lack of support of integrated proposals and funding constraints; time duration of projects; difficulties of language, logistics and access.

Lele and Norgaard (2005) classified four barriers of interdisciplinary research: 1) the presence of unadmitted value judgements in the work of scientists often leading to normative positions rather than neutrality; 2) strong allegiance to one's school of thought rather than exploring different, contextual explanations and embracing complexity; 3) epistemological differences between different disciplines; 4) the influence of society on the perception of a particular discipline and its perceived importance and relevance.

A large part of the criticism of interdisciplinarity is also rooted in the argument that interdisciplinarity does not have its own theoretical and methodological framework, as disciplines do (Lele and Norgaard 2005). In an academic environment based on and organised along disciplinary lines, this is a particular challenge to overcome.

1.3.2   Transdisciplinarity

1.3.2.1   Advantages of transdisciplinary research
Transdisciplinary research has a number of advantages compared to disciplinary, multidisciplinary, and interdisciplinary research approaches (Cronin 2008). Some of the advantages are summarised here:

- The primary benefit of transdisciplinary research is the creation of new knowledge by crossing disciplinary boundaries.
- It supports the analysis of complex problems from different perspectives and a detailed understanding of the issues at hand.
- It enables the participants to deal with complexity, uncertainty, change and imperfection.
- It encourages system thinking and guides the participants to look at the whole and its relationship to the parts of an issue.
- It involves researchers and the public in the whole research process. Consequently, it enables the integration of multiple knowledges overcoming the epistemological barriers between academia and non-academia.
- It enlarges the view and perspective of participants to incorporate issues outside disciplinary boundaries.
- It enables participants to jointly learn about (and understand) complex problems and to facilitate knowledge exchange.
- It targets societal issues or needs and expectations of the society. As a result, it bridges the gap between research and practice.

1.3.2.2   Challenges in transdisciplinary research

Currently "*many research institutions work on the basis of reward structures and practices that support disciplinary research rather*" (Cronin 2008:17) than transdisciplinary research. Therefore, the progress or success of transdisciplinary research is dependent on the commitment or willingness of the institutions' leadership. Most of the challenges of interdisciplinary research listed under 1.3.1.2 also apply to transdisciplinary research. However, transdisciplinary research is also collaborative and involves people from different backgrounds. Consequently, "*it requires extra time to build consensus and for participants to learn new approaches from other knowledge systems*" (Cronin 2008:17). Most scientists continue to prefer and do basic research rather than applied research or working on issues raised by the society.

Transdisciplinary research deals with complex topics. Therefore, it is challenging to grasp the complex nature of the problem, to link abstract and case specific knowledge, and to generate information which satisfies all team members. Additionally, transdisciplinary research is implemented by team members from different disciplines. Each discipline has its own methods, theories and languages. On top of this there are team members from the public or non-academia who are new to the technical jargons. This creates communication problems among team members. This diversity may lead to conflict while framing the research issue and validating different knowledges. This has also been observed by team members of the TRANSACT project; it took about two years to equally understand the concept of the project and methods and outputs of each activity. Thus, the management of transdisciplinary research is very difficult. It requires concerted effort to integrate diverse perspectives and all the dimensions of complex problem. In the TRANSACT project one major challenge was that many team members had other commitments in their institutions, and were only willing to commit limited periods of time to the project. Transdisciplinary research however is time consuming – and results may not easily be visible.

Transdisciplinary research projects require close and continuous collaboration, time for networking, and for knowledge transfer to other stakeholders, which can be quite costly. It takes time to build consensus and to combine research methods and cultures, thus making them more difficult to plan than single discipline research projects. (Cronin 2008)

Teams of transdisciplinary researchers are usually established to deal with particular issues across research groups and institutions. Yet, relationships among the team members may not persist after project end. In that case valuable lessons learned may not be passed on and the development of transdisciplinary research itself as a mainstream research endeavour will not be further strengthened, as long term experiences got lost at an early stage.

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2   Procedures of engagement

Birgit Habermann

This section explains the experiences the TRANSACT project has made with different inter- and transdisciplinary methods applied in some activities of the project. As an example we take an activity that focused on joint research activities with farmers, PhD students and researchers (activity 3.3), and an activity that was organising experience sharing across sites (activity 3.4), and an activity documenting learning outcomes of the project (activity 4.3). All three activities were experiencing different challenges, but also some similarities. They all shared the difficulties of applying inter- and transdisciplinary methods in an environment not aligned to these methods: on the one hand the institutional environment at and among the partner institutions that provided little backup for such approaches; on the other hand a political and societal setting in Ethiopia and Austria that did not enable equitable participation in decision-making processes.

2.1   Scenario planning (Activity 3.3)[4]

2.1.1   Scenario process

In this activity scientists, PhD and MSc students of the partner institutions were supposed to work in watershed areas. These sites were identified in a baseline study earlier on in the project. For a long time it was unclear to the consortium how this could best be done – finally BOKU suggested using the method of scenario planning and offered training on this after the approval by the Ethiopian partners. This activity was a great opportunity for project members to apply some of the principles of trans- and interdisciplinarity in the field and by doing so bringing new stakeholders on-board, making the voices of farmers and extensionists heard in the rural areas.

Following the initial training, the core team responsible for activity 3.3 started with workshops on driving force identification in February 2013. Six themes pre-defined by the scenario team based on the baseline survey carried out at the beginning of the project were used to identify and group the changes/trends of each research theme in the past and the coming ten years. Based on the trends the major driving forces behind those changes/trends were identified.

A preliminary watershed assessment by the core team was conducted for consultation of stakeholders at district/*woreda*[5] and watershed level for surfacing the foundation of the scenario workshops. The field work was commenced with common understanding, the sequential process of scenario method and what preparatory work and intervention activities were incorporated in each scenario planning step. In this regard, focus group discussions and key informant interview with farmers, development agents, experts[6] working at district and

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[4] Summarised based on Essa *et al.* (2013).

[5] District, administrative unit.

[6] In Ethiopia the term „experts" in the context of rural development is mostly used for government officers in rural and agricultural development working at district and zonal level.

zonal level and district focal persons of the SRMP-NG project were made. In addition specific tools like transect walk, seasonal calendar, and wealth ranking were attempted to be employed to develop a detailed household livelihood profile for the farm households and for analysis of both livelihood diversification. During the preliminary assessment team members in consultation with SRMP-NG focal persons and *kebele* leaders have chosen accessible places within the watersheds for conducting the workshops.

In each workshop on driving force identification participants included farmers' representatives, chairmen of the *kebele*, heads of *woreda* level offices, relevant development agents from each *kebele* and experts from the district. The selection of farmers' representatives took into account sex, age, institutional relevance and wealth status, and the selection was made by the development agents, SRMP-NG district focal person and Thematic Area Coordinators (TACs) for each theme. In the three watershed workshops a total of 196 farmers and 101 experts, administrators and decision makers from different *woreda* level offices have participated.

Independent focus group discussions in each theme were held by farmers and experts and finally they presented their findings. Team members have also led the discussion by asking questions and present their inputs from literature, triangulate the results by analysing the ideas from the farmers' and experts' groups.

Following the workshops the team members looked at the consistency of the different driving forces across the themes. Additionally they discussed other (according to the team members) critical aspects such as government policies and strategies, that were not mentioned during the workshops.

The second workshop series aimed at the analysis of driving forces in March 2013. This was done in a relatively short period of time, i.e. within one week, in all three watersheds using ranking, controllability and cross-impact analysis. (see 2.1.2)

These latter workshops intended to identify which driving forces were most relevant and which ones were most uncertain. Therefore the workshop aimed at ranking driving forces that had already been identified during the first workshop, and it looked at the controllability of driving forces as well as a Cross Impact Analysis of driving forces.

2.1.2   Methodological challenges

The workshops were attended by an average of about 100 participants per watershed. Those participants were farmers, experts and administrators. The team considered it as a success and positive indicator that almost all participants who attended the first workshops also attended the second round.

The team tested the methods before going to the field, and regularly exchanged experiences and suggestions for improvements. However, the method itself posed a number of challenges. One challenge was the issue of Cross Impact Analysis. This is a rather complex method – first ranking controllability, and then doing the cross impact analysis of around 23 factors. It was very challenging especially for the farmers; therefore it was finally completed only with the government staff members.

2.1.2.1   Ranking of driving forces

The first step of the analysis (workshop series 2) is ranking of driving forces according to their relevance. Each workshop participant ranked those driving forces. The parameter given was the degree of relevance or impact for the change observed in the last ten years in the watershed, restricted to one of the six themes. As a number of farmers were illiterate, this was also challenging in practice. The driving forces were written on different pieces of paper, and the researchers had to assist the farmers in selecting the driving forces.

Finally the results of the ranking were summarised with the weighted average method. Only the 10 to 13 top ranked driving forces were selected, the others were excluded from further analysis.

2.1.2.2   Controllability analysis

The 10 to 13 remaining driving forces were evaluated by each participant individually regarding how the different government levels (federal, regional, local) were intervening concerning the driving forces. Only the results' summaries for the local level were used for the next step, the cross-impact analysis. As already indicated above, this was the most challenging step for the researchers in terms of explaining the method to illiterate farmers. The researchers tried going through the steps by reading out the driving forces, moving pieces of papers and using flip charts. However, it remained a challenging task.

2.1.2.3   Cross impact analysis

In a third step of the analysis, Cross Impact Analysis was done. The central question was: "If driving force A occurs, how much does it influence another event B to occur?". The respondents had to arrange the potential drivers of change in a matrix. In this matrix the same drivers were arranged in the rows and columns. This was done to identify the effects of interactions between drivers of change or the occurrence of specific events, trying to identify the most active and the most passive factors. Due to the complexity of explaining this task to illiterate farmers, this was done only with the government officers.

2.1.3   Final stage

As a final step of the scenario process the researchers are working out "future briefings workshops". These serve to communicate the results per theme, and to prepare the ground for the development of an integrated scenario for the watersheds.

2.1.4   Reflections

While the scenario process was welcomed as an innovative new approach appealing for a number of reasons such as its technicality, its nature as a defined framework and set of methods to apply, and its potential for numerical and graphical representations, it still posed a number of challenges to the researchers. The main issue was that they were sent to the field without much experience in a rather new method – and using a method grounded in social research without much background in this field. Thus the researchers were also taken by surprise by the fact that many farmers were really struggling in following their explanations and carrying out the exercises as planned. The method was after all developed in a U.S. military defence service context. According to Enfors (2008) the method works in different contexts, yet the method has

some challenges that are hard to overcome. This somehow also affected the participation of the farmers, which would have been quite crucial for the process, and the researchers had to make some adaptations. At this time, the final workshops have not taken place, so the final results are not yet known. However, it is clear the future operation of scenario method will need a more interdisciplinary and more gender-balanced backup in the team composition, and it will have to be preliminary adjusted to the conditions in the field to fulfil its claim for transdisciplinarity.

2.2   Experience sharing (Activity 3.4)[7]

The idea behind this activity was to enable more communication between farmers and researchers, and between different farmers. The objectives were to share experiences, to identify what works and discuss what to learn from this, to reflect on the experiences and document success stories. The activity slightly diverged from the original intention: originally the plan was to enable more information exchange also between farmers and other stakeholders from outside, however the focus of the activity was on the farmer to farmer experience sharing. Additionally, the consortium in its first meeting agreed on the following policy regarding field visits in this activity:

"• The consortium will avoid "field visits" to the watersheds. Rather than visiting, the project partners should engage with the communities and allow them to talk to them, instead of talking to them only.

• The development of content oriented sharing possibilities to ensure interaction along specific activities is necessary."

(Peloschek and Hauser 2011:8)

The idea behind forming farmer clusters was also a different one: they were supposed to form learning groups together with the researchers who would work together over the entire project period. But several delays lead to the change of plan, and finally the clusters were basically groups of model farmers in the three watersheds. The project was working with these groups only for the experience sharing visits.

The researchers thus identified best practices from all three watersheds and identified the already existing model farmers. Then they organised one field day per watershed where they were visiting together with different stakeholders such as government officers from the agricultural office and extension as well as the selected model farmers. All of this was done in close cooperation with the Austrian Development Project SRMP-NG, thus it was also not clear to what extent the farmers were referring to this project in their comments, or how much they knew about TRANSACT.

This experience shows the difficulty of putting transdisciplinary research in practice. While the field days certainly were interesting events and learning opportunities, they still remained far from the original plan that had foreseen a more open process of engagement. Yet the way this was designed was not corresponding well with the existing system of working with farmers: the

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[7] Summarised based on Endalkachew (2013).

normal way of doing this was through the model farmers. Furthermore, it is difficult to imagine for most scientists (all over the World) that they can work together on an eye-to-eye level with farmers, jointly doing research. This was also hard to imagine for most scientists in this project, and thus the activity turned into something else, less transdisciplinary, but more feasible in the given context.

2.3 Learning outcomes (Activity 4.3)[8]

The decision for this activity came at the first consortium meeting of the project, when the consortium members felt that there was a need for an activity to document learning outcomes throughout the project. Indeed, soon after the first consortium meeting it became obvious that the project had some challenges on the thematic orientation to overcome. Some of these challenges could be overcome at an early stage; others have persisted throughout the project period. However, they provided important learning grounds that this activity tried to capture. The activity looked at institutional learning procedures, more specifically different perceptions, attitudes, and methodologies in research and teaching, as well as partnership.

The methods applied were mixed between qualitative and quantitative, although the emphasis was on qualitative research and analysis. The idea was to capture different understandings and perceptions of project terminologies, and the overall understanding of the actual project in its theoretical and methodological approach at the beginning and at the end of the project. This was done with focus group discussions at the partner institutions, and important stakeholders like an Austrian funded development programme and the Woreda (district) experts responsible for the three selected watersheds. In addition to this, an online survey was circulated among consortium members that looked at related issues, but in a more anonymous and less selective way. This was done as a means of triangulation and to overcome bias, as the selection of participants for the FGDs was beyond the control of the researchers. Many participants of the first round of FGDs also did not really have an interest in the project at that stage, as it was not clear what the project was about, and what their role in the project could be. At the second round of FGDs this was different – the participants were at least partly involved in the project. Although even then the extent of involvement, and thus also the understanding of what the project really was about, differed vastly. It became clear that the project did not achieve its aim of institutionalising the topics it was working on. The way the project officially understood transformation was endorsed by at least part of the researchers, but the terms inter- and transdisciplinarity still lead to confusions among most of them. And as the participating researchers were mostly (male) natural scientists, their appreciation and understanding of the nature of the required social research methods and their theoretical backgrounds depended very much on their personal background and experiences. Some of them had a personal interest in the issues; others had practical experiences (mostly with participatory methods). However, very few were sufficiently familiar with inter- and transdisciplinary research to feel comfortable in explaining to others what it was about, let alone practice it independently in their research.

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[8] Adapted from Habermann *et al.* (2013).

Some colleagues at the Austrian partner institution even uprightly refused to discuss the terminologies, as they found it theoretical and unnecessarily complicating matters. These discussions showed also the different epistemologies at the Austrian and Ethiopian partner institutions, their different ways of dealing with definitions, and of dealing with knowing and not knowing something.

In order to learn more about the participating institutions' strategies of teaching, research and outreach the activity had also planned to analyse teaching materials and observe teaching in class. This plan had to be abandoned, as it took long time to organise it. It was difficult for the Austrian activity team leader to explain to team members and the project's institutional coordinators what the purpose of this research was. The classes suggested initially were not actually relevant for the topic of the TRANSACT project, and finally the team leader asked the project management to quit this plan.

Knowing and understanding each other's competences (and one's own) was certainly an important learning outcome of this project. Beyond that, the project also helped the partners to learn more about each other's working cultures. There was also a serious debate about scientific quality and standards (e.g. referencing systems and intellectual property rights) within the consortium. These disagreements lead at times to considerable tensions between the partners. To capture such disagreements and also emerging conflicts between the partners this activity looked at important minutes, project documents, and reports for analysis. During important moments of the project and some consortium meetings reflective notes were written. Some non-systematic data collection was carried out during consortium meetings such as the contribution flower that encouraged participants to write on a "flower petal" what their contribution to the project ("the flower") would be.

The more challenging part of the methodology for this activity was the research in the watersheds. After long discussions and many changes the final decision was to focus on purely qualitative methods. These comprised observation, reflective diaries and informal interviews. These methods were more ethnographic, such as reflective observation, which was also not ideal given the short time periods the researchers would spend in the field. Many of these methods were seen with great scepticism by other consortium members.

However, the team was afraid that the frequent visits of other researchers within the framework of TRANSACT to the same three sites would have already deterred farmers from cooperating on a more in-depth level. Initially, both extension and farmers – and to some extent even the researchers themselves – expected this project to be intervention-based. But in reality it remained very much on a meta-level. The visits of TRANSACT researchers to the watersheds were also of an extractive nature, where researchers would arrive to collect data such as household surveys or focus group discussions, and then move out again without returning to give feedback. The project was organized in activity teams that often had very little linkages between them in the beginning. Several efforts were undertaken to create this linkages by the project coordination. Finally since March 2013 they were considered to be functioning. Thus the teams operated independently for two years, and no one really felt in charge of explaining to

the farmers what the purpose and output of the project would be. This incoherence also made it hard for this activity team to follow up on the research done in the watersheds. Observations were difficult when researchers only came for a one day visit to collect data. Therefore the team decided to concentrate on two activities only, and those were also the ones expected to dedicate most of the time to research in the watersheds. These were the two activities explained above (3.3 and 3.4). The observations of the two team members were summarized as such in the progress report of the team (Habermann, Worku, Teklu and Peloschek 2013).

The other big challenge for the team members of activity 4.3 was that they lacked experience in the required methods. One team member was a recently graduated sociologist, however with little practical experience in the field, another other team member was an experienced field researcher and agro-economist with little background in qualitative social research methods as required for this purpose, and another one had some qualitative social research background yet no experiences in the Ethiopian context. However, unlike other teams this activity had two female members out of five total members. This was also an advantage in terms of field research, as a male researcher would not have been able to interact with female farmers in similar ways.

2.4 Recommendations for inter- and transdisciplinary research based on TRANSACT's experiences

- Pay attention to gender balance and gender issues (and note that gender does not only refer to "women's stuff", compare also (Crewe 2000, Harrison 2012).
- Ensure you have the right competences in your team and in your institution and observe disciplinary balance also moving beyond your own department.
- Provide timely and adequate training for the planned methods.
- Inform other stakeholders timely, comprehensively and repeatedly.
- Ensure the research team is able and willing to work respectfully and competently with other disciplines and with other people, who are not academic and maybe perhaps very different from what they are used to.
- Plan sufficient time to cater for unexpected delays, team drop-outs, and other unforeseen obstacles.
- Plan continuous monitoring and information exchange, also at the end of the project. The people you have been working with as well as the stakeholders in transdisciplinary research have the expectation and the right to be informed, and to inform others.
- If you work across different cultures, take time to build good relations with each other: this is an additional challenge and might take up a considerable amount of time or lead to considerable frustrations if not treated accordingly.

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3   Qualitative research methods

Birgit Habermann

3.1   Qualitative research methods

There is comprehensive literature available on qualitative research methods (Glaser and Strauss 1968, Miles and Hubermann 1994, Bernard 2002, Ritchie and Lewis 2003, Clarke 2005, Lewins and Silver 2007, Corbin and Strauss 2008 and others) that are also applicable for inter- and transdisciplinary research. There are also ample publications available on social research methods for sustainability (e.g. Bell 2010, Bell 2012, Franklin and Blyton 2011) and other more focused applications that can be used in the context of inter- and transdisciplinary research. However, this section does not provide a literature review on the comprehensive list of methods available, but it introduces a selection of methods that were discussed in the TRANSACT project as possible methods, or that have been applied in practice by the project.

The criteria for selection of the methods presented in this report were that they should be suitable to address inter- and transdisciplinary research questions; they should be applicable either in field or organizational research; the benefits, risks and opportunities should be known; and they should indicate a potential to contribute to transformation processes.

3.1.1   Scenario planning

Scenario planning is a method that looks at future possibilities without relying on one selected projection; rather it tries to engage a variety of stakeholders in developing different visions for their future: A scenario process is a structured discourse on the future by stakeholders and experts - by designing consistent future images, the scenario approach intends to sketch a broad spectrum of possible developments options (Penker and Wytrzens 2005:176).

The method is complex, but it is also suited to address complexity and uncertainty in rural development – yet it is noteworthy that is not trying to predict the future, rather it offers imaginations on different possible future scenarios (compare Abiyu *et al.* 2012). It has been developed for "knowledge integration in order to inform decision-making under uncertainty, by providing descriptions of possible future scenarios." (Abiyu *et al.* 2012:2). It is particularly useful for landscape planning (Penker and Wytrzens 2005) and environmental modeling (Garb *et al.* 2008), but it also has wide applications in business, military and government settings (McDonald *et al.* 2009).

Penker and Wytrzens (2005:180) suggest the following procedures for a scenario process:

Reception and presentation of the participants

Introduction of topic and scenario technique

Step 1: Identification of the relevant driving forces

Step 2: Weighting of the driving forces regarding their importance

Step 3: Formulation of long-term development options for each driving force

Step 4: Generation of two coherent scenarios

Step 5: Naming of the two scenarios

Step 6: Analysis of consequences and strategies

Final debate

Feedback and end

Such a process can last between one day and several months, depending on available resources and the commitment of the participants. To engage people in the process, a wide range of moderation and partly also participatory techniques are used (see box 3.1).

The process aims at an improved understanding of the future, without predicting it – it can assist in communication, building aims, exploring and broadening knowledge and in decision making and developing strategies (Braito 2012). A core concept in the scenario process are driving forces: those are defined as threats and opportunities, they indicate change without indicating direction or dimension, they represent changes in society, politics and technology and are thus symptoms of transformations, but they are not necessarily problems (Braito 2012).

Box 3.1: Scenario planning
Potential to adress inter- and transdisciplinary research questions: high
Type of research: Field research
Potential to contribute to transformation processes: high
Benefits, risks and opportunities:
    Suitable to address uncertainties and complexities
    Can address a variety of different issues
    Comprehensive, participatory and explorative
    Assists in decision-making
    Complexity of the method can create challenges to facilitators and participants
    Can be quite resource- and time-consuming
    Requires substantial moderation and facilitation skills, well-experience moderators in the different methods applied
    Involves many different disciplines without competition, also transdisciplinary in its nature and approach
    Can develop a "broad spectrum of possible development options" (Penker and Wytrzens 2005:176)
Methods:
    World Cafè
    Delphi Method
    Story telling
    Brainstorming/-writing using cards and Mind maps
    Ranking methods
    Different visualization tools
    Consensus plenary discussions

3.1.2   Critical reflection on participatory methods

In inter- and transdisciplinary research participatory methods are frequently applied when it comes to qualitative social research methods. However, the way participatory methods have been framed and applied in practice must be seen critically in terms of the way methods are selected and implemented somewhat deliberately, whilst such sensitive modes of engagement should actually be planned and structured carefully (Cooke and Kothari 2001, Cornwall 2008)

(Bell *et al.* 2012). The broad range of interpretation of what extent of participation the facilitator can admit or prevent (Oxley Green and Hunton-Clarke 2003) is another point of debate - it is a long way from information and consultation to handing over decision-making. Furthermore, participation has also given "development" a soft image of being close to the people "at the grassroots" (Escobar 1991), but using the term only does not deliver the promise. When farmers get involved in participation, it is often for information, consultation and labour. Over-researched communities nowadays tend to refuse to participate, or ask for relatively high remuneration: "*'You can't eat participation, can you?', one disgruntled would-be community representative, who was expected to mobilize his fellow community members without receiving any of the handsome salaries that his NGO counterparts were paid, once said to me and asked, 'what is in it for us?'*" (Cornwall 2008:274-275).

Participatory methods are also used to generate data quickly. Transdisciplinary research however takes time. Ideally farmers would work with local partners that are well familiar with the area and who bring fewer disturbances to the process. Participatory transdisciplinary research wants to enable people to make their own decisions (empowerment and transformative participation), but beyond that it should enable people to follow up, monitor and document their activities, and finally present the output to different audiences. Participation in decision-making in a relatively short-time frame often involves only village leaders and/or model farmers and excludes marginalized members of the society. The people who are involved in the process are not always in a position to make their voices heard or even to voice their opinions: "*Being involved in a process is not equivalent to having a voice. Voice needs to be nurtured. People need to feel able to express themselves without fear of reprisals or expectation of not being listened to or taken seriously.*" (Cornwall 2008:278). There is no control over what the participatory process triggers, and sometimes there can also be negative consequences.

In addition, careful communication with other stakeholders is necessary: for participation to become effective there must be "*efforts 'from above' and 'from below'*" (Gaventa and Robinson 1998 in Cornwall 2008:278), but both of it takes time and commitment: "*they cannot be achieved by waving a magic participation wand, convening a participatory workshop or applying a few PRA tools and hey presto, there is empowerment*" (ibid). These are long processes where continuous communication with local stakeholders, but also government authorities on different levels, NGOs and other interest groups are vital.

In summary, participation is maybe a tool for empowering people - but depending on who applies it how and for which purpose, the actual intention and result can be quite the opposite of empowerment: "*What is vital, is that it is clear to all participants and project partners what aspects of the project are 100% participatory and what aspects are not. Charting the project along the participatory continuum allows everyone involved to understand the limitations and opportunities of their involvement and the risks involved.*" (Beardon and Newman 2009:51)

3.1.3   Methods in practice
The range of methods suitable for inter- and transdisciplinary research is wide. Therefore the preparation of research needs careful consideration as to which method is suitable for which

purpose. The researcher should try to answer the following questions before deciding on the methods (compare also e.g. (Beardon and Newman 2009):

- Which different disciplines will be involved? What experiences of interdisciplinary work do the different researchers and other participants have?
- Who are the people participating in the research process?
  - Who will facilitate the process? What level of experience, education etc. do they have?
  - If transdisciplinary, who will be the [(non-)scientific] stakeholders? A clear understanding is required of who these people are, what their interests, their possible fears and reservations are, and in which ways they would most likely communicate.
- What possibilities are there for a stakeholder process in formulating the research objectives, hypothesis and research questions?
- What information is needed to answer the research questions?
- Where can I get this information? Who can provide it?
- Time duration: will this be a long term engagement or do I only have a short time window? Transdisciplinary and participatory research may be time consuming, it also requires repetition, and it should be iterative.
- Level of participation/transdisciplinarity: how far can I go? Which level of participation can I reach?
  - What other aspects do I have to take into account?
  - Methods should be developed for conducting research AND the implementation of research findings.
  - Method development not only concerns data collection, but also knowledge management, dissemination and research into use.
  - Regarding knowledge management in the institutions, plan how to avoid shelving of knowledge.
  - The methods will have to link to organizational learning processes as well. If knowledge and field experiences do not feed into the organization as a whole, the process is lost.
  - Local voices must be heard, but they need a forum. What innovative methods exist? Is there a willingness and possibility to engage on that level?
- Think about developing guidelines for interviewing and keep to inter- and transdisciplinary principles. These guidelines must then be binding for all researchers participating, and take ethical issues into account.
- Methods for documentation, reflection and analysis must be part of the initial methods' development.
- Develop a sound system for data processing, storage and analysis considering ethical issues and quality assurance.

To be able to apply the finally selected methods, a researcher should take care to properly familiarize him/herself with the method, its background and theory, possible pitfalls, risks and

benefits and its implementation. There is not much worse for the process than standing in front of the respondents being unable to explain how for example the ranking or scoring was supposed to be done, or how to do a Venn diagram. The researcher or facilitator has to try out the method repeatedly with others, in order to be reassured in its application.

Part of professional and thorough preparation is also to learn as much as possible about the social worlds of the respondents: "*Stimulating effective and powerful ripples of change in society through communication and knowledge processes involves knowing where to 'drop the pebble' and who is best placed to drop it. In other words, it demands local knowledge and understanding of local cultures and systems.*" (Beardon and Newman 2009:25). Rather than using too many fancy and complicated methods sometimes simple dialogue may be useful. Dialogue can also enable learning as a liberative process, empowering and as a driver for change (Beardon and Newman 2009). However, for some specific questions and specific targets group the careful selection of well-adapted methods is crucial. The following sections provide an overview son some selected methods applied or discussed during the TRANSACT project. The list is neither comprehensive, nor is it directive. Each researcher must decide by him-/herself which method is most suitable for the questions he/she would like answer, and the people the researcher is working with.

3.1.3.1   Focus Group Discussions (Gilbert 2008)

Focus Group Discussions (FGDs) are a widely used special type of group interview in which the researcher controls purpose, size, composition, and procedures of the group. Ideally the researcher would apply specific criteria for the selection of participants and the topics are decided beforehand. Example would be FGDs among lay people about the use of different medical technologies to understand acceptance and barriers to acceptance among the general public (compare e.g. Felt *et al.* 2009).

Purpose[9]:

- To identify motives for certain behaviours, as well as challenges related to those.
- To get inputs in how to handle such issues.
- To collect some preliminary data before starting a larger, quantitative survey.

Procedure: For an FGD a team of recruiters is required to locate and invite participants; a moderator or facilitator for group discussions; note takers and observers (notes on responses, non-verbal behaviour, tape recording,...). The moderator uses a list of open-ended questions and induces an interactive discussion of the topics. The moderator does NOT pressurise the group to arrive at consensus. He or she must have knowledge on the topics, as well as social skills to interact with groups of people, to gain their trust and to respect them. Crucial is the ability to facilitate discussion, and to ensure the participation of everyone. During the discussion he/she should be aware of cultural sensitivities, rules/taboos etc., and he/she should control

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[9] See http://www.partizipation.at/focus-group.html.

time and rhythm of discussion. The groups should be homogenous (not too many different strata!) and share characteristics relevant to the study (e.g. group of female organic farmers). At least two FGDs are needed for each category in a study to allow comparison of responses, e.g. separate FDGs with men and women in a number of villages: comparison between men and women across and within villages.

Participants: Experts, or lay people, concerned with a specific issue, or politicians, take care that the group is homogenous enough for a discussion but still as heterogenous as possible.

Level of involvement: Consultation

Duration of procedure: 2 hours

Number of participants: Optimal group size 6-8.

Experience in TRANSACT and reflection: In TRANSACT (as common in Ethiopia) FGDs were used as group meetings or group discussions to collect ideas and general opinions on broader issues, rather than as FGDs with a narrowly defined focus. If published, this might lead to confusions as the reader will have a different method in mind when reading the findings.

FGDs, if carried out as described above, have many **advantages**. They are quick and inexpensive, they are useful to identify beliefs, attitudes and behaviours, and they are useful in indicating a range of beliefs in a community, as well as in identifying topics for further exploration in e.g. semi-structured interviews. For some participants they provide a more relaxed and enabling setting than single subject interviews. However, there are also **disadvantages**: sometimes it can be really difficult to focus on the actual topic, the means of control for the facilitator are limited. There is no information on the frequency or distribution of beliefs and behaviours in a population, and the results are harder to interpret than in different types of interviews. And if many people are talking, only few questions can be addressed due to time shortage. People also tend to influence each other. The sequence of response is an important factor in this respect. Also note that the results are not representative due to the relatively small number of participants.

Analysis: The FGDs are usually transcribed from a tape recording. Together with the observation notes, these texts can be analysed by using a programme such as Atlas-ti or by methods like discourse analysis. Different FGDs can also be compared against each other.

3.1.3.2 Key Informant Interviews
Interviews with key informants are a common approach, often applied together with participatory methods as a first entry point to the community. Methodologically this approach is hardly reflected upon critically.

Purpose:

- To gain first-hand information regarding a community by talking to specifically identified persons
- To establish trust and gain an entry point into a community

Procedure: Key informants play a key role in ethnographic research, where they are identified as "*people whom you can talk to easily, who understand the information you need, and who are glad to give it to you or get it for you*" (Bernard 2002:196). Finding a good key informant is of course also a case of good luck, but primarily it depends on your principal entry point to the community whom you will select. Of course you may encounter interesting and cooperative key informants later on, but it is more common that researchers stick with only a few key informants, and these are often the ones they started working with in the beginning: "All successful ethnographers will tell you that they eventually came to rely on one or two key people in their fieldwork" (Bernard 2002:198).

Participants: community leaders, experts, leaders of social groups/institutions,…

Level of involvement: Consultation

Duration of procedure: can range from one hour to repeated encounters of several hours

Number of participants: depends on the size of the village, however representation of the different strata in the community should be maintained

Experience in TRANSACT and reflection: Key informants not only provide important background information, they can also introduce you to other relevant people. This makes them rather powerful figures in your research process. It is often the case that "*the first informants with whom you develop a working relationship in the field may be "deviant" members of their culture*" (Bernard 2002:198). Thus, although they are meant to be representative of the community, key informants tend to be quite the opposite. In the case of Ethiopia they are most likely to be model farmers, thus more innovative, better networked and also wealthier than the average farmer in the community you are researching. Bernard (2002) recommends not selecting key informants too quickly; he rather recommends collecting other data and getting to know the area better, and to check the roles of key informants in the community as well as their statuses. There is in fact an inherent risk of getting purposely or unintentionally lead astray by key informants that were selected without thorough consideration of the social structure in the communities: "*Be sure that the key informants you select don't prevent you from gaining access to other important informants*" (Bernard 2002:199).

Analysis: As key informant interviews are mostly informal or semi-structured, data analysis is also qualitative and uses discourse analysis, software like Atlas-ti and other qualitative data analysis methods.

3.1.3.3   Transect Walks[10]

This is a useful method if the researchers are not familiar with the project area, and it helps researchers also to get to know people in the area in a rather informal way.

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[10] Pretty *et al.* (1995)

Purpose:

- To get to know the project area
- To talk about things of local importance, to observe different parts of the project area

Procedure: First the route must be identified, then the participants are selected. They are ideally a cross-section of the community, men and women, young and old, rich and poor etc. The group should not become too big. The researcher(s) should be able to engage with people repeatedly and personally during the walk. Important is that the researchers remain focused on their topic and what they want to find out.

Participants: Research team and local people, often key informants

Level of involvement: Consultation

Duration of procedure: Several hours, depends on size of project area

Number of participants: 5-10

Experience in TRANSACT and reflection: In Ethiopia often transect walks are carried out by large groups of researchers and model farmers as representatives of the community. The different researchers then often get lost in their own interests, and there is no common theme in the way they are talking to the farmers, who by themselves cannot be considered as being representative for the community.

Analysis: A transect diagram is usually made by the researchers in accordance with the other participants.

3.1.3.4   *Wealth Ranking (Pretty* et al. *1995)*
Wealth ranking is more commonly known as Well-being Ranking. There are different ways of doing this, however it remains a sensitive issue that needs to be addressed carefully.

Purpose:

- To provide an understanding of definitions of wealth/well-being in a community
- To gain an overview on the stratification within a community in terms of wealth/well-being

Procedure:

Usually this is done with pile card sorting, and by using a village map that provides the list of households. The name of each household head will be written on a card. These cards will now be presented to different pre-selected villagers during interviews. First the interviewee will be asked for his/her own definition of wealth/wellbeing, then he/she will be asked to sort the cards into classes of wealth/wellbeing. If there are e.g. 35 households in one village, each interviewee will arrange those households as cards in piles according to their perceived wealth/well-being levels. This will be numerically recorded in a table that gives an overview on all interviews. As a

last question, the interviewee is often asked to compare the households between the different piles: what is the difference between those in one group as compared to another?

Participants: Individuals (community members, farmers,...)

Level of involvement: Consultation

Duration of procedure: Several days

Number of participants: A representative sample of the village, depends on the size of the village

Experience in TRANSACT and reflection: This method is straightforward to explain and analyse, but it touches very sensitive issues and can cause a considerable amount of harm if not applied carefully. It should only applied if the facilitator is certain that the participants will not feel uncomfortable in doing this exercise. In any case confidentiality is important.

Analysis: The final table of wealth/well-being ranking can be statistically analysed. Aggregate scores can be calculated and different wealth classes will be defined.

3.1.3.5   World Cafe[11]

The World Café method wants to create a more relaxed atmosphere for an open debate on specific topics. It therefore offers a setting similar to a coffee-house, where ideally small groups are sitting at round tables to exchange ideas, opinions, types of knowledges. This method wants to facilitate open dialogue and debate, but it also wants to create new insights on specific topics by doing so.

Purpose:

- To collect different perspectives, types of knowledge, ideas
- To facilitate exchange between different people
- To come up with new ideas and options
- Not for planning for implementation, or as a follow up to decisions already made

Procedure: "*Usually the method involves three consecutive rounds lasting 20 to 30 minutes each, in which four to six persons sitting round a table in a relaxed atmosphere discuss a particular issue in terms of predetermined questions. Discussions in such small groups are efficient, and the results are documented. After round 1 the participants move on to other tables, except for a host / hostess, who stays at his or her table and summarizes the key ideas from the previous round for the benefit of the new arrivals, while those who have left the table also spread these ideas. All those taking part thus exchange ideas in an extremely dynamic way; every single person can contribute knowledge and experience, suggestions crop up and creative new ideas appear – all in a very short time.*

After several rounds the most important results are gathered at each table and presented to the entire group; finally the results are talked over in a plenary session. "[11]

Participants: citizens, politicians, administrators, managers, experts, representatives of specific groups,…

Level of involvement: Joint decision, consultation

Duration of procedure: One day to one week

Number of participants: Medium-sized to large groups (at least 15 people)

Experience in TRANSACT and reflection: The World Café method was applied during consortium meetings and was well received. At the 2nd consortium metting in Gondar University Guest House the term "transformation" was discussed and a debate on the dimensions, processes and context of rural transformation kicked off. The positive aspect was that it enabled people from different disciplinary backgrounds to discuss in a fairly relaxed way. In contrast to larger plenary debates, it also opened the floor to people who had hesitations to talk in front of a larger crowd.

Analysis: This method serves to collect different ideas and perspectives. This are collected and then presented in a report. Important is to stay authentic and avoid too much interpretation of data afterwards.

3.1.3.6   Delphi Technique (Pretty et al. 1995)
The Delphi Technique is similar to brainstorming.

Purpose:

- To assess trends and developments
- To generate ideas, look at different issues and identify questions
- To rank and group priorities

Procedure: Issues, topics and questions will be collected with brainstorming, either individually or in groups. The papers where those are written down will be placed on a wall and then grouped (ideally by all participants). Only exact duplicates will be merged, other ideas should not be manipulated. Then the group clusters the cards in order to create theme areas. The groups must reach an agreement how to do this without overruling and silencing divergent opinions.

Participants: Everyone

Level of involvement: Consultation

Duration of procedure: 30 min or more

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[11] http://www.partizipation.at/world-cafe.html

Number of participants: 15 upwards

Experience in TRANSACT and reflection: A workshop to create the linkages between TRANSACT activities was conducted in June 2012. Dynamic facilitation was used to establish the linkages between the activities and this developed the critical paths between the activities. As a result the general understanding was reached that the scope and arrangement of the contribution from one activity to the other must be elaborated by the team leaders themselves. And all the information required from one activity to the other must also be requested by the team leaders themselves.

Analysis: This method serves to support people in decision-making. The final outcome is already the result and does not need further analysis.

3.1.3.7   Story Telling: Oral Testimony (Beardon and Newman 2009)

Oral testimonies are a rich and resourceful tool. They require time and interviewing skills, but they yield a diverse and often very personal account that is hard to encounter with other methods.

Purpose:

- To enable quieter members of communities or groups to contribute their testimony

Procedure: Oral testimonies can be given by community members or other individuals in a private atmosphere. They are in-depth interviews "drawing on personal memory and experience. The one-to-one nature of the interview and the use of local interviewers enable 'quieter' members of communities to participate […]" (Beardon and Newman 2009:32). These interviews are recorded and later transcribed and translated if necessary.

Participants: community members, or sometimes local/national NGO workers and journalists

Level of involvement: Consultation

Duration of procedure: Several weeks

Number of participants: One per testimony

Experience in TRANSACT and reflection: not applied. In general, the advantage of this method is that it is authentic and brings different voices alive, it is very powerful and honest and takes care for detail and reflection. People often come up with unexpected ideas, and analysis of particular challenges or situations. The risk is that scientists may discard such first-hand accounts as non-academic, too detailed and not serious. (Beardon and Newman 2009)

"There is definitely a bias towards using academic literature to inform programming and strategy, whereas people turn to oral testimonies for quotes and to add 'colour' to their writing." (Beardon and Newman 2009:26)

Analysis: The data are narrative and qualitative. The analysis can be done with qualitative methods such as discourse analysis or by using software such as Atlas-ti.

3.1.3.8   Story Telling: Critical Stories of Change (Beardon and Newman 2009):

Critical Stories of Change are a tool originating in organisational management. However, it can also be applied in other contexts.

Purpose:

- To understand how change takes place and which challenges it involves
- To facilitate reflection on change

Procedure: "*To develop a critical story, the writer spends time with key stakeholders in the different contexts related to the project, facilitating discussions to uncover the key drivers of change, and at the same time challenging stakeholders to analyse the change more deeply. This in itself brings about change.*"(Beardon and Newman 2009:46-47)

Participants: Everyone

Level of involvement: Consultation, joint analysis and reflection

Duration of procedure: Several weeks

Number of participants: Unspecified

Experience in TRANSACT and reflection: not applied. The advantage is that there are also personal relations evolving during the process, and ownership develops. It can be an effective learning tool for organizational learning and is easy to distribute. The risk is that it may involve a broad range of topics, work and people. Tensions may arise in defining and documenting the story – people have different perspectives and levels of involvement in the change, and such tensions must be addressed by the writer with care. The story process enables dialogue and the sharing of different perceptions, thus also generating new knowledge. How this is used, and what impact the stories have, must be carefully monitored. (Beardon and Newman 2009)

Analysis: The data are narrative and qualitative, and partly the analysis is already part of the process. Further analysis can be done with qualitative methods such as discourse analysis or by using software such as Atlas-ti.

3.1.3.9   Story Telling: Community Stories (Beardon and Newman 2009)

Community Stories have similar advantages as Oral Testimonies. They can be done in groups and provide room for many and diverse perspectives of the stories.

Purpose:

- To assist groups to understand complex situations
- To assist groups in decision-making

Procedure: Possible methods are Appreciative Inquire (AI) or Participatory Narrative Inquiry (PNI). We found PNI more suitable, because it has more focus on authentic stories of personal

experience, and it makes room for different perspectives. The stories are interpreted by the narrators themselves, and they can also be analysed in groups.

This takes place in three steps (Beardon and Newman 2009: 64):

Gathering stories*: "People in the community recount their experiences while others listen. As a facilitator, you might help people focus on topics of concern to the community while including a diversity of perspectives. You might also ask people to reflect on their stories and annotate them with comments or answers to relevant questio*ns." (Beardon and Newman 2009: 64)

Working with stories: "*A group of people (sometimes the entire community, sometimes a subset) uses a variety of narrative methods to make sense of the stories and discover transformative insights.*" (Beardon and Newman 2009: 64)

Returning stories: "*The stories go back into the community in some way, for example by providing direct access to what has been collected, by reporting on the sense-making activities that took place, or by taking informed action based on the insights gained. Again this will often be a facilitated process.*" (Beardon and Newman 2009: 64)

Participants: Everyone

Level of involvement: Consultation, joint analysis and reflection

Duration of procedure: Several weeks

Number of participants: Unspecified

Experience in TRANSACT and reflection: not applied. The advantage is that stories are local and create a context for facts to be better understood. They can thus be used complementarily. The important aspect is the creation of a better insight and understanding leading to better decision-making: "*Stories are the vehicle, not the destination*." (Beardon and Newman 2009: 64). The risk is that the facilitator plays an influential rule, and has a lot of responsibility. To avoid the abuse of the power of stores, a clear role for managing the ownership of the created stories is important. (Beardon and Newman 2009)

Analysis: The data are narrative and qualitative. The analysis is already part of the process itself. More in-depth analysis can later be done with qualitative methods such as discourse analysis or by using software such as Atlas-ti.

3.1.3.10 Brainstorming (Pretty et al. 1995)
This is often applied during meetings and workshops to collect a wide range of ideas. It is a very easy to use, straightforward tool that yields a lot of inputs in a short time.

Purpose:

- To collect a preliminary list of ideas, topics, issues,….

Procedure: Group insights are used for later grouping and sorting. One person records the ideas, the others think about different issues and topics, as many as possible. Either people call out their ideas and the facilitator writes them down or each participant writes all his/her ideas on a piece of paper.

Participants: Everyone

Level of involvement: Consultation, joint analysis and reflection

Duration of procedure: 15 to 30 minutes

Number of participants: Unspecified

Experience in TRANSACT and reflection: Applied during consortium meetings. The advantage is that within a short period of time many ideas from the entire group can be collected. It gives a good insight into the general status – however, it is also possible that too many new ideas and divergent suggestions come up that will be hard for the facilitator to handle. The facilitator must also take care not to allow any judgmental comments on people's different ideas and suggestions.

Analysis: The data are qualitative, and not meant for further analysis. The final list out of this collection of ideas can be done by using another method such as Delphi Technique (see 3.2.3.2) or Mindmapping as explained below.

3.1.3.11 Mindmapping

Similar to brainstorming, this can be applied to look at a larger set of ideas and topics within a short time in a group. In contrast to brainstorming, mindmapping has already got an analytical element as well.

Purpose:

- To analyse preliminary list of ideas, topics, issues,….
- To understand connections and linkages

Procedure: People draw a mental map of a list of ideas, topics and/or issues. The main point will be located at the centre, and the adjoining points are connected with arrows, that can be uni- or multidirectional. Comments can be added, and sub-topics can be created easily. It can be done individually or in groups, on a sheet of paper, on the ground or by using computer software such as Freemind or Mindmanager.

Participants: Everyone

Level of involvement: Consultation, joint analysis and reflection

Duration of procedure: 30 minutes

Number of participants: Either individual or in groups of up to 5 people

Experience in TRANSACT and reflection: Not applied. It could have been useful for example at the planning stage of the project to enable the different project participants to develop a more holistic understanding of the project itself, and to enable the management team to see opportunities, but also challenges in project implementation.

Analysis: The data are qualitative, and not meant for further analysis. The different maps are the result that can be compared and discussed.

3.1.3.12 Ranking methods (Pretty et al. 1995)

Ranking methods come in many different forms and shapes. They are popular because of their potential to assist in decision-making as well as the quantitative representation of the results that are appealing to researchers in terms of reporting potential.

Purpose:

- To facilitate a group decision on a list of criteria, topics, issues, etc.
- To capture the priorities of a larger group of people in relatively informal way.

Procedure: There are different methods widely used in participatory processes, e.g. matrix ranking and scoring, pair-wise ranking, preference ranking and other variations. Usually the list of issues for ranking is already prepared by the facilitators who guide through the process. The groups need a note-taker as well. The different methods of ranking have different levels of complexity, but they are widely known and applied.

Participants: Everyone

Level of involvement: Consultation and decision-making

Duration of procedure: 1 to hours

Number of participants: Groups of 4-5 people

Experience in TRANSACT and reflection: Applied during the scenario process. The advantage is that with very few resources and a short time impressive results can be achieved that are relevant in terms of decision-making, data analysis (see below) and reporting. However, there are also risks: the procedure can be quite complex to explain, and also difficult to understand for people who are not used to these methods. Especially for illiterate people it can be quite challenging. A common mistake that also happened in TRANSACT during the scenario process was that the list of items to be ranked where too many. Especially in comparative ranking such as pairwise ranking this can be extremely challenging. Equally, the challenge of working with illiterate people had been underestimated leading to exhaustion and frustration among both participants and facilitators.

Analysis: The data are presented in tables and can be used with quantitative data analysis methods (Chambers 2007). (see also chapter 4)

3.1.3.13 Visualisation tools (Pretty et al. 1995)

A range of methods can be subsumed under visualisation. These methods are not for everyone, some people are more interested in visual representations, others less so. Sometimes participants also refuse to participate in visualisation exercises, or simply feel unable to contribute.

Purpose:

- To demonstrate linkages and relationships
- To understand cooperations and the importance of different institutions
- To enable a more holistic understanding of the issues at hand.

Procedure: A commonly used visualization tool is the **Venn Diagram**. Here people are divided in groups according to their knowledge and relation regarding the institutions or organisations that will be looked at in the diagram. The different institutions/organisations (e.g. university, extension service, social institutions,…) or even individuals with special roles will be symbolized by paper circles and/or squares of different size. The larger the paper is, the more important the institution is. However, this can also be done without paper, by drawing on the ground.

The papers can either be arranged on a circle, or in relation to the person or group is doing the diagram. In that case, the "self" (as the group or individual) is located at the centre. The next parameter is therefore proximity – the closer the papers are too each other, the more overlap there is, the more contact and linkage exists between them. This also links to the "self" – the closer the papers are to the one representing the "self" the more important they are for the person or group.

Participants: Everyone

Level of involvement: Consultation.

Duration of procedure: 30 min to 1 hour.

Number of participants: Group work, up to 5 people per group.

Experience in TRANSACT and reflection: not applied. The advantage is that certain hidden aspects regarding institutions can be visualized here in a very informal way. Also linkages previously unnoticed will become apparent. Different roles, responsibilities but also areas of conflict can emerge from the diagram. These can also be used to solve such issues, in doing a series of such diagrams to reach an improved version. The risk is that some people simply do not like visualization and find it difficult to imagine their relationships with different institutions in such a way. Others may be afraid of negative consequences if they issue such statements about powerful institutions playing a vital role in their lives and livelihoods.

Analysis: The data are visual, and best analysed in diagram comparison looking at the differences between the representations of different people/groups.

3.1.3.14 Consensus plenary discussions[12]

These are plenary discussions that aim at an agreement towards a specific issue, or at least to a debate that enables the organisers to understand the public opinion on a certain issue.

Purpose:

- To enable intensive dialogue, mostly between non-specialist citizens and experts, on controversial issues
- To find answers to controversial topics
- To understand public opinion on specific issues

Procedure: "*Roughly 10 to 30 interested citizens, representing the population as closely as possible with respect to age, sex, educational attainments and occupation, are selected.*

With the aid of background reports, newspaper articles, commentaries etc. they get to grips with the question at issue, and meet together twice to prepare for the conference.

The consensus conference itself is spread over three consecutive days. Experts present the subject-matter in depth; the participants have opportunities to question the experts and to discuss the issue. Finally the participants draw up a report in writing with their consensus standpoint, recommendations and justification for these. The report is presented to decision-makers. "[12]

Participants: Selected citizens, experts, politicians and administrators

Level of involvement: Consultation, joint decision

Duration of procedure: Several weeks

Number of participants: Unspecified, groups of any size

Experience in TRANSACT and reflection: not applied. The advantage is that it provides a forum for specialists/experts and non-specialists/citizens to discuss in an open forum. Citizens get the chance to learn more about a specific topic and then confront experts with their opinions on it. Discussing in several rounds enables an in-depth debate. The risk is that the pressure to reach a consensus in a relatively short time may lead participants to agree on the "lowest common denominator".

Analysis: The data are already presented in the report at the end of the conference, no further analysis needed unless the researchers want to compare different reports with qualitative tools, e.g. with discourse or content analysis, or by using Atlas-ti or similar programmes.

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[12] http://www.partizipation.at/consensus-conference.html

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4   Presentation, analysis and interpretation of data
Bisrat Misganaw

4.1   Data presentation

4.1.1   Methods of data presentation

Having collected and edited the data, the next important step is to organize it. That is to present it in a readily comprehensible condensed form in order to draw inferences from it. Data can be presented as tables, diagrams or graphs. For most of the qualitative data analysis there is already an explanation given in the previous chapter, therefore this chapter goes more into detail on analysis of quantitative data. Some of the methods can also be applied to quantified qualitative data.

4.1.1.1   Tabular presentation

Qualitative variables: Can be applied after categorizing the qualitative variables into different levels that are possible to use such as simple table, custom & stacked table and cross tabulations to collect the output of frequency corresponding to percentage.

Quantitative variables: Quantitative random variables are divided into two discrete and continuous.

- *Discrete variables:* If the values of the variable are possible to count, then the variable is called discrete. For this type of variable it is possible to use a table similar to qualitative variables as discussed above.
- *Continuous variables:* The value of the variable is possible to express in terms of decimal points. There is an infinite number of possible points between two adjustment measurement values. For continuous random variables it is possible to order the mean, median, mode, variance, standard deviation, skewness, kurtosis, coefficient of variation and others by using descriptive tables.

4.1.1.2   Diagrammatic and graphic presentation of data

Diagrams are appropriate for presenting discrete as well as qualitative data. The three most commonly used diagrammatic presentations of data are pie charts, bar charts and histograms.

A **pie chart** is a circle that is partitioned into different sectors corresponding to the relative frequency of the item of each category. For **bar charts** a set of bars (thick lines or narrow rectangles) "*is used to represent and compare the frequency distribution of discrete variables and attributes or categorical series*" (Getu and Fasil 2005: 51). Finally **histograms**, as well as frequency polygon and cumulative frequency graph, are methods of graphical representation for continuous data. Among these the most appropriate is the histogram, which is a graph that places the class boundaries on the horizontal axis and the frequencies on a vertical axis. Class marks and class limits are sometimes used as quantity on the X axes.

4.2   Methods of data analysis

Data analysis is concerned with categorizing, ordering and summarizing data while interpretation is essentially a follow-up which first involves the search for the meaning and applications of the research results, and secondly makes references relative to the problem studied, and ultimately draws conclusions about these relationships. The main divisions of data analysis and interpretation, together with the respective statistical tools and techniques adopted, are explained below.

4.2.1   Descriptive statistics

Measures of central tendency are measures of the location of the middle or the centre value of a distribution. The various methods of determining the actual value at which the data tend to concentrate are called measures of central tendency or averages. The most commonly used averages are:

- Mean: The mean is defined as the sum of all the values of the item divided by the total number of items.
- Mode: It is the value of the distribution that occurs with the highest frequency among all the observations in a sample.
- Median: It is the centre value of an order data.

Measures of dispersion (variation): The scatter or spread of items of a distribution is known as dispersion or variation. In other words the degree to which numerical data tend to spread about an average value is called dispersion or variation of the data. Measures of dispersions are statistical measures which provide ways of measuring the extent in which data are dispersed or spread out.

- *Variance:* The larger the variance the more variability of the distribution is there.
- *Coefficient of Variation (C.V):* In situations where either the two series have different units of measurements, or their means differ sufficiently in size, the coefficient of variation should be used as a measure of dispersion. CV used to compare the variability of two or more sets of data that have quite different mean values. It is defined as the ratio of standard deviation to the mean usually expressed as percentages. The smaller the C.V., the more consistent is the data and vice versa. For fixed experiments, C.V is generally reported. If C.V is low it indicates more reliability of experimental findings.

4.2.2   Statistical tests (Z- tests, t-tests, F-tests, ANOVA)

Hypothesis testing is a tentative assumption regarding the value of population parameter whose validity is checked by statistical methods or a procedure that helps in ascertaining the likelihood of hypothetical parameter of a population being correct by using sample statistics. It allows researchers to use sample data and to infer the results from the sample to the population. The goal of hypothesis testing is to decide whether the results of a study indicate a real relationship between variables, or if the results simply show the random fluctuation that would be the result of chance. (University of Guelph, 2006)

The way that a hypothesis test is applied may differ slightly depending on the type of statistic used; however, every hypothesis test has the same basic procedure. The following are main steps in hypothesis testing:

a) Formulate the null/Ho/ and alternative hypotheses/HA/
b) Specify the level of significance (a)
c) Select the appropriate tests statistic
d) Determine the critical value for the chosen level
e) Compute the value of the test statistic/calculated value/ and the critical value
f) Compare computed value of test statistic and the critical value
g) Decision: Reject Ho if computed test statistic fall outside the acceptance region, else accept Ho is computed test statistic falls within the acceptance region
h) State the conclusion
i) Hypothesis Test Based on Two Samples
j) Independent Sample T- Test

The rationale for the test of significance is as before. Assuming the null hypothesis is true (i.e., that there is no difference in the population means), one determines the chance of obtaining differences in sample means as discrepant as or more discrepant than that observed. If this chance is sufficiently small, there is reasonable evidence to doubt the validity of the null hypothesis; hence, one concludes there is a statistically significant difference between the means of the two populations (i.e., one rejects the null hypothesis).

- Z- Test: If the population variance is known; for large sample size ($n \geq 30$) and the population is normal, then the probability distribution is a Z distribution. If the Z-calculated is greater than Z- tabulate/critical we are forced to reject the null hypothesis. If the decision is rejected we are confident that the averages of two samples are different.

- T-Test: If the population variance is not known and n is small ($n < 30$) and the population is normal. If the T- calculated is greater than T- tabulate/critical we are forced to reject the null hypothesis. If the decision is rejected we are confidential the averages of two samples are different.

- Paired (Dependent) Hypothesis testing for difference of means: The technique known as self-paired (paired-sample), measurements are taken on a single subject at two distinct points in time. "*The characteristic feature of paired samples is that each observation in one sample has one and only one match or matching observation in the other sample.*" *(Getu and Fasil 2005:213).* One common example for paired samples is before and after experiment. That means individual is examined before a certain treatment has been applied and then again after the treatment has been computed. "*The comparison of means for paired observations is simple and reduces to the methods already discussed. The key to the analysis is that concern is only with the difference for each pair.*" (Getu and Fasil 2005:214).

- Analysis of Variance/ANOVA: One-way ANOVA for comparing more than two means. Analysis of variance is used to test the hypothesis that several means are equal. This technique is an extension of the two-sample t test.

4.2.3   Relational statistics (correlation, multiple correlation, chi-square test)

"**Correlation** *is the method of analysis to use when studying the possible association between two continuous variables. The standard method (Pearson correlation) leads to a quantity called r which can take any value from -1 to +1. The correlation coefficient usually calculated is called Pearson's correlation coefficient, r (as it is discovered by Karl Pearson). Correlation coefficients lie within the range -1 to +1:*

The sample correlation coefficent(r) defined and interpreted as follows

- *If $0 < r \leq 1$ we say there is a positive correlation between the variables.*
- *If $-1 \leq r < 0$ we say there is a negative correlation between the variables.*
- *If $r = 1$ we say there is a perfect positive correlation between the variables.*
- *If $r = 0$ we say there is no linear correlation between the variables.*
- *If $r = -1$ we say there is a perfect negative correlation between the variables.*" (Getu and Fasil 2005:233).

Chi-square Test (Test of Association): A chi-square distribution is useful in making statistical inferences about categorical data in which the categories are two and above (Agresti, 2002).

For hypothesis testing the following applies:

- Ho: the two attributes are independent (there is no significant association between the two attributes).
- H1: the two attributes are dependent (there is a significant association between the two attributes).

"*If the value of the chi-square distribution is zero, then there is a perfect agreement between the observed and the expected frequencies. The greater the difference between the observed and expected frequencies, the larger will be the value of chi-square distribution.*" (Getu and Fasil 2005:221).

4.2.4   Statistical models (regression, logistic)

To see the relationship between dependent or outcome variable and independent random variables the researcher better to use statistical models like linear and logistic regression models rather than tests.

Regression Model: When the type of dependent variable continues the most appropriate model is linear regression. Regression "*is a statistical technique to determine the linear relationship between two or more variables. Regression is primarily used for prediction and causal inference*" (Campbell 2008:3). The variable whose value is to be estimated or predicted is known as dependent or predicted variable; while the variables whose values are used to determine the value of the dependent variable are called independent or predictor variables.

Regression could be classified in to two types according to the number of variables. If the variables are only two (one dependent and one independent), then the regression is called simple regression. If more than two variables are involved then the regression is known as multiple regressions.

The regression slope (b) also called the regression coefficient indicates the value by which the variable Y changes for a unit change in X.

- If b is positive, we say there is a direct relationship between the two variables.
- If b is negative, we say there is an inverse relationship between the two variables.
- If b is zero, we say there is no linear relationship between the two variables.

Multiple linear regressions (MLR) is a method used to model the linear relationship between a dependent variable and one or more independent variables. The dependent variable is sometimes also called the predicted, and the independent variables the predictors. MLR therefore is based on least squares: the sum-of-squares of differences of observed and predicted values are minimized (Hadi 2006). As a consequence, special attention must be paid to a regression assumption about the independence of the residuals.

Logistic Regression Analysis: Regression methods are an integral component of any data analysis concerned with describing the relationship between a categorical response variable and one or more explanatory factors. It is often the case that the outcome variable is discrete, taking on two or more values. Depending on the number of categories in dependent random variable there are three types of logistic regression models.

- *Binary Logistic Regression Model:* The model can have an arbitrary number of parameters and terms in the model representing qualitative variables, quantitative variables, and interaction terms in order to model dichotomous or categorical outcome variable. When explanatory variables are included to model probabilities, a problem is that probabilities are restricted to the domain between 0 and 1, whereas a linear effect for an explanatory variable could take the fitted value outside this interval. Instead of the probability of an event, one may consider the odds: the ratio of the probability of success to the probability of failure.
- *Polytomous Logistic Regression Model:* This is the extension of a (binary) logistic regression; here the categorical dependent outcome has more than two levels (Agresti 2002). One possible way to handle such situations is to split the categorical response variable in several ways and apply binary logistic regression to each dichotomous variable. However, this will result in several different analyses for only one categorical response.
- *Ordinal Logistic Regression Model:* When the response variable Y is ordinal, the categories can be ordered in a natural way. The polytomous logistic regression model can be applied but does not make use of information about the ordering. One way to take account of the ordering is the use of *cumulative probabilities, cumulative odds and cumulative logits*.

Table 4.1: Major Types of Statistical Software's used for Data Analysis (Source: Bisrat Misganaw 2013)

Cluster	Area of research	Appropriate Software	
		1	2
Social Sciences	Population Studies	SPSS	
	Social Work	SPSS/ E-prime	STATA
	Sociology	SPSS	STATA
	Geography & Environmental Studies	GIS& Remote Sensing	SPSS
	Development & Environmental Mgt. Studies	GIS& Remote Sensing	SPSS
	Geology	GIS& Remote Sensing	SPSS
	English Language & Literature	SPSS	
	Amharic Language & Literature		
	Psychology		STATA
	Social Anthropology		STATA
	Gender & Development		STATA
	Civics & Ethics		
	History & Heritage Studies		
Education	Special Needs	SPSS	
	Education Planning Management	SPSS	
Law	School of Law	SPSS	
Veterinary Medicine	Clinical Studies	SAS	STATA
	Veterinary Pharmacy & Biomedical Science		
	Unit of Para clinical Studies		
	Veterinary Epidemiology & Public Health		
	Animal Production & Extension		
Agriculture	Plant Science	SAS	STATA
	Natural Resource Management		
	Water Resource Management		
	Agricultural Economics		
	Rural Development		
Business & Economics	Accounting	STATA	SPSS
	Marketing Management	SPSS	
	Tourism Management	SPSS	
	Management	SPSS	
	Economics	STATA	SPSS
Natural Science	Statistics	STATA	SAS
	Biology	SAS	SPSS
	Bio Technology	SAS	SPSS
	Chemistry	SPSS	Origin
All Medicine & Health Sciences	Environmental Occupation health & safety	STATA	SAS
Engineering	Civil, Mechanical, Water ,Electrical, Architecture Engineering	Minitab	

4.3　References

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5   Documentation and dissemination

Yihenew G/selassie

"Documentation" reminds us of written documents primarily – however, today there is a large variety of technical tools to assist us in documenting knowledge such as video tapes, audio recordings, digital archives etc. Documentation produces different materials that provide official information or evidence or that serve as a record, but also as data archive.

Transparent documentation fosters communication, and it is part of professional knowledge management. Documentation is useful in research since it promotes evidence-based practice; assess interventions and evaluate outcomes.[13]

While in transdisciplinary research documentation is also carried out in cooperation with the participating stakeholders, in interdisciplinary research documentation is usually done by the researchers alone.

5.1   Raw data

Data storage of raw data must be systematic and transparent, yet it should also safeguard respondents' confidentiality if applicable, and protect otherwise sensitive data. The possibility to retrieve data must be ensured, and data should be stored on different media and in different locations.

5.2   Progress report

Progress reports played an important role in the TRANSACT project. On the one hand their purpose is of course to update the donor on the work progress, potential obstacles as well as new opportunities. It also explains which goals have been accomplished, how the resources have been used and whether the project workplan and the budget are on track. It also helps project managers to assess whether there is a need for changes in the workplan of the project, the budget plan or maybe even the team composition. And it shows which work is still open, and how it will be achieved. Progress reports can therefore be valuable learning tools for donors, researchers and their organisations.

5.3   Dissemination of research results

5.3.1   Target groups

Research results should be disseminated to various segments of the society. The ways results are disseminated differ based on the need of the recipient of the information.

5.3.1.1   Farmers

Farmers have less interest in learning about neither the various scientific jargons nor the detailed, theoretical methodologies of achieving the results. They are interested in the practical

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[13] http://www.cno.org/Global/prac/learn/modules/documentation/slides/Purpose.pdf

applications of scientific work, e.g. the methods applied in the field, and the outputs and outcomes of the research. This enables them to assess whether the research results will be applicable for their own purpose.

A good example are fertilizer recommendations in kilograms per hectare for a maize crop, as usually developed by researchers. However, farmers in Ethiopia do not usually convert the recommendation per hectare basis. Their plots are small, and often less than one ha in size. Therefore they prefer to know how much fertilizer measured in volume of bottle stoppers is required for each maize stand at planting and at knee-high stage separately for urea and DAP. It is crucial to reach an agreement among researchers, extension experts, farmers and other stakeholders regarding the means of measurement for certain recommendations to be used by farmers.

5.3.1.2   Researchers

Researchers understood their task as the discovery of new things or the improvement of old practices. Their task is a lot to elaborate methodologies and to conduct the research to achieve new outputs. Hence they are more interested in the theoretical aspects of the methods, and the more theoretical interpretations of the results of these methods.

5.3.1.3   Agricultural experts

Agricultural experts in Ethiopia, as already explained in chapter 1, are government officers in rural and agricultural development working at district and zonal level. Hence, they are situated between researchers and farmers. Among them the development agents have day to day linkage with the farmers and relevant subject matters. On the other hand, experts found at the district level are highly involved in implementing research and development recommendations. They transfer improved technologies, skills and practices recommended by the researchers to the farmers. Their expectation is that research results should reach the extension system in the form of technological packages, training materials and guidelines.

5.3.1.4   Policy makers

Policy makers are interested to see the final recommendations generated from the research system using the money collected from the tax payers and allocated to research. They would like to see the changes achieved using the new system compared to the previous one in terms of yield (crop, forest products, feed, etc) or monetary terms. They want to get evidence that can boost the economy of the country, or at least a certain state or other smaller administrative divisions.

5.4   Mechanisms of disseminating research results

There are various mechanisms through which research results are disseminated to recipients. The mechanism of dissemination depends on the nature of the research; the expectations and previous involvement of recipients, as well as their level of education particularly in terms of literacy; accessibility of recipients to the technology for dissemination (e.g. no network coverage for mobile phones, no access to TV or radio,…); and the feasibility of dissemination in terms of available resources. Among others, the following are common mechanisms of disseminating research results in Ethiopia.

5.4.1   Radio

Radio is one the easiest way of disseminating research results especially to farmers and agricultural experts. In areas where there is no access to internet and television, radio remains to be the best way of disseminating research results. Radio programs should be short and informative. A series of short programs is more preferable than one and long broadcasting where farmers may lose interest of listening to it.

5.4.2   Newsletters

Special newsletter columns can serve as best ways of posting research results. Even though the number of readers of newsletters seems declining due to other sources of information like the internet, it still remains to be useful. It is recommended to publish them in local languages.

5.4.3   Technology package

Research results should be developed into technology packages so that they reach to the farmers through the extension system. A technology package is a guideline containing information on how to use research outputs. An example of this is a package of released wheat variety with its agronomic practices. The technology packages should be geared towards experts working at *woreda* and *kebele* levels.

5.4.4   Popular media

Local popular media like magazines and newspapers could be used to disseminate research results. Some local newspapers like "*Bekur*" are popular in districts which can contain relevant information that can be used by *woredas* subject matter specialists.

5.4.5   Using video

Video clips can be used as teaching tools. Such participatory videos can be produced by researchers and experts based on results of a particular research together with farmers. The video clips will be short ones narrated in local languages to give specific lessons. A good example could be application of *fanyaa juu* soil bund in mountainous Ethiopia.

5.4.6   ARDPLAC

The Agricultural Research and Development Partners' Liaison and Advisory Council is one of the fora where research results are popularized. This forum gives the opportunity to various stakeholders to communicate on agricultural problems, research recommendations and future directions on research and development.

5.4.7   Policy brief

Research results should also be communicated to policy makers, especially those making decisions on budget allocation for implementation. Short reports indicating the major findings and the role of the findings for agricultural development, natural resources conservation and overall economic growth should be prepared and communicated to policy makers.

Policy briefs have a clear target group and concise contents explained in jargon-free language. Their length varies between two and six pages, this depends also on the number of illustrations used such as photographs, graphs, tables and figures. While the use of such graphical

illustrations is recommendable, care must be taken not to overload the text. Also such illustrations must be self-explanatory, clear and graphically well designed.

The structure of a policy brief should be oriented towards the target group. The introduction gives the reader a brief insight into the contents and recommendations; a background section contains all information required to assist the reader in easily understanding the text; a case study illustrating the message of the brief in practical terms is highly recommended; the final part is a short summary of conclusions and recommendations that assists the reader to apply the findings in his/her own work.[14]

However, it is recommended to work with professionals in science communications and public relations as well as graphical designers to develop a policy brief. It is a professional showcase of institutional research outputs and should be handled with great care.

5.4.8 Websites
Developing websites and posting research results is another important method of communication among researchers, extension workers and policy makers – however, in Ethiopia it also excludes many users such as farmers who rarely have access to such facilities.

There is a good website development example in the Ethiopian agricultural research and development system where research outputs are disseminated. The Ethiopian Agricultural Portal website (www.eap.gov.et) was developed by the project entitled Improving Productivity and Market Success (IPMS) and the Ministry of Agriculture. This site presents a lot of information on the Ethiopian agricultural system including recommendations and production manuals.

5.4.9 Farmers-Researchers-Extension Groups (FREGS)
Farmers-Researchers-Extension Groups (FREGS) are research for development groups whereby research results developed by the research system are popularized. In this system, farmers organize themselves into groups to test and adopt released technologies under the supervision of researchers and extension officers. This approach has been successful in pushing previously shelved technologies to the farming system.

5.4.10 In-service Training
In-service training is education for employees to help them develop their skills in a specific discipline of occupation. In-service training takes place at the time a new person assumes his/her work responsibilities. Such kind of training introduces new research results with lectures and handouts.

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[14]Examples can be found at http://steps-centre.org/publications/briefing/ and http://www.odi.org.uk/publications/briefings.

5.4.11   Conferences and Publication in Proceedings

Research results could be communicated at conferences and workshops to the scientific community, extension workers and policy makers - and to farmers and other non-scientific stakeholders, especially in transdisciplinary research. Usually, power point is used as a means of presentation. However, the current trend is away from power point and towards seeking alternative solutions that engage more directly in dialogue with the audience. Furthermore, the use of different media such as audio, video or performances (theatre, dance,…) becomes more and more common.

Traditionally, presentations were documented in the proceedings of the conferences and workshops in order to reach wider audiences. However, in the international scientific ranking system such publications are not rated highly, therefore there is a tendency to move away from that and towards special journal issues, or publishing the proceedings online, often as pdf files of power point presentations, audio and video recordings.

5.4.12   Publication in Scientific Journals

Documentation of research results in scientific peer reviewed journals is a common way of disseminating research results to the scientific community. Research results should be original, and must be written following specific journal formats. Unfortunately, a large part of the more renowned scientific journals have not yet subscribed to Open Access, but support for Open Access is increasing on an institutional level.

5.4.13   Monographs, Books and Reports

Such type of media provide the scope for more elaboration on a specific topic than short articles for journals. However, they are time-consuming and expensive to produce. Dissemination to target audiences may be another challenge in Ethiopia. However, there are some organisations in Ethiopia such as the Forum for Social Studies (FSS)[15] that publish such types of media and are very successful in dissemination and outreach.

Table 5.1: Information dissemination methods to different target groups.

Target groups	Information dissemination method
Farmers	Radio, FTC level training, farmers-research-extension group (FREG), field visits, famer to farmer information exchange, *kebele* meetings, cultural and religious gatherings, leaflets, workshops, informal meetings, popular media, video clips.
Agricultural experts	Technology manuals, guidelines, seminars, in-service trainings, newsletters, ARDPLAC, websites, farmers-research-extension group (FREG), popular media, video clips.
Researchers	Newsletters, ARDPLAC, websites, farmers-research-extension group (FREG), conferences, proceedings, scientific journals.
Policy makers	Policy brief, ARDPLAC

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[15] http://www.fssethiopia.org/

There are quite a few important points to remember when writing a report or communicating new findings. This overview adapted from Dawson (2007) also emphasises the importance of thinking about one's audience:

1. *What style do they prefer?*
- For the scientific community, journal articles are usually preferred, while for the extension system the final recommendations with implementation manuals are needed.
2. *Do they understand complex statistics or do you need to keep it simple?*
- Statistical procedures need to be well elaborated and presented for the scientific community while this procedure may not be useful for development interventions.
3. *Have they the time to read through reams of quotations or are they interested only in conclusions and recommendations?*
- Some people have little time to read the entire report. In such cases putting a summary containing the brief description of the research work and the final conclusions and recommendations could be useful.
4. *Are they interested in your methodology?*
- Some segments of the society are interested on the final recommendation than the methodology of achieving the results. For example, policy makers are very interested on technologies that may replace artificial fertilizers that are imported using scarce hard currency. If a researcher finds out that compost can equally perform as imported artificial fertilizers, he should report the findings to policy makers by comparing the differences in yield and cost between the two inputs. The policymakers are not interested as such on the methodology of the experiment.
5. *Do you need to write using complex terminology or do you need to keep your language as simple as possible?*
- It is generally recommended to use plain, clear language. In case of using complex terminologies, it is necessary to be sure that the readers can understand it very well from the context of the sentence.
- The type of research results dissemination methods to be followed should be decided by the trans-disciplinary team to be established. The methods should be decided by the consensus of the team that will involve researchers, farmers and other stakeholders that will involve in the research.

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6 Resource Section

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6.6   Journals

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