Handbook PTD
A Guide for Participatory Technology Development

Experiences from Participatory Agricultural Research in Central India

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EXCELLENCE FOR SUSTAINABILITY

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Switzerland

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List of Abbreviations

FFS	Farmer Field Schools
FtF	Farmer-to-Farmer Extension
ITK	Indigenous Technological Knowledge
LEISA	Low External Input Sustainable Agriculture
PRA	Participatory Rural Appraisal
PTD	Participatory Technology Development

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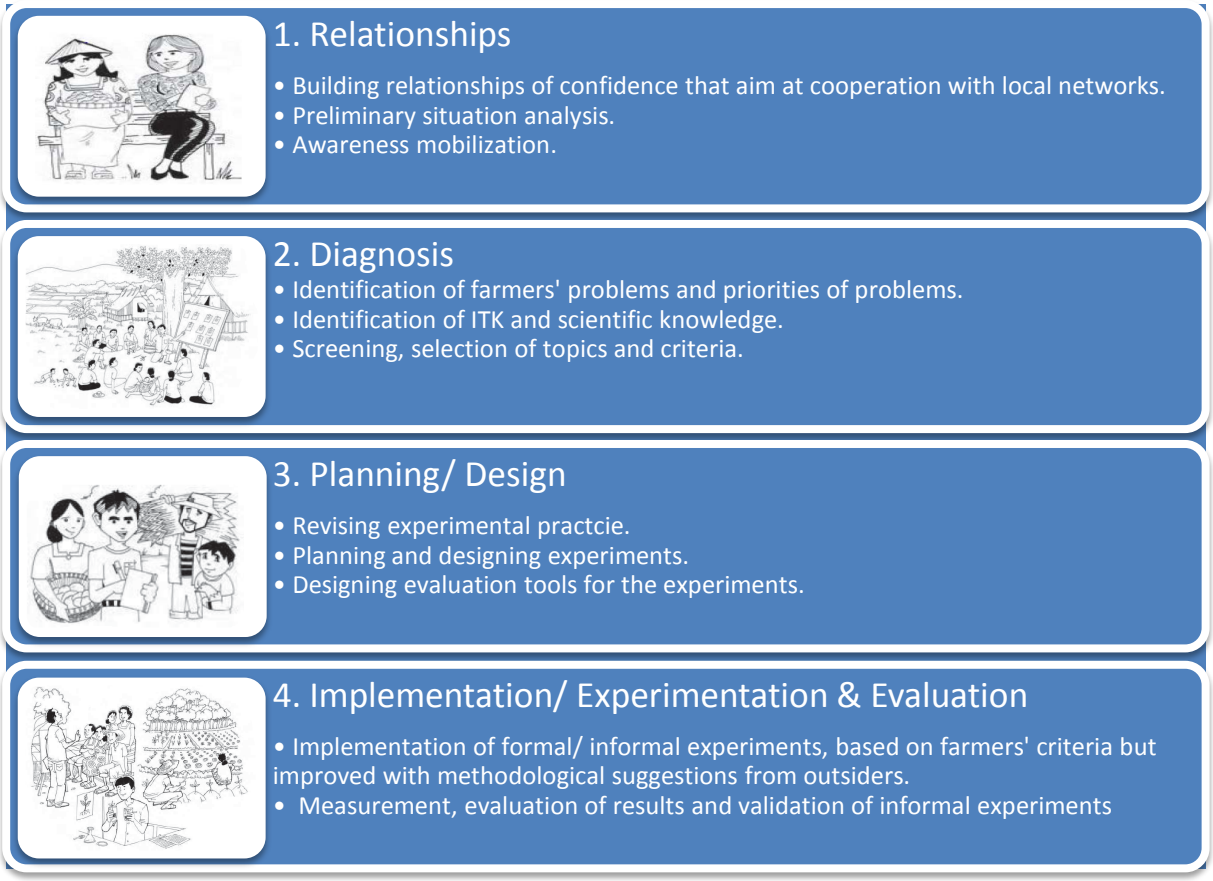
1. Introduction

Practicing *Participatory Technology Development* can be challenging. Despite the magnitude of participatory toolkits there are no specific tools for PTD. It is the mixture of traditional PRA-tools with methods of often formal and researcher-managed on-farm-research that characterizes PTD. Thus, PTD-practitioners have the ambitious task to balancing scientific requirements, the satisfaction of local needs and sustainable development.

This handbook addresses the methodological preparation of different activities in the context of *Participatory Technology Development*. In doing so, participatory tools are not introduced according to their tool type (diagrams, matrices, maps, etc.). Instead, generic tools are categorized according to their adequacy in different PTD-project stages: initial diagnosis, planning, implementation of experiments and evaluation, as well as dissemination and consolidation.

Activities of a PTD-project

The key part of PTD is experimentation and evaluation. However, for the effectiveness of these core activities some preliminary as well as following activities are necessary. Figure 1 illustrates the typical sequence of activities during a PTD-project.



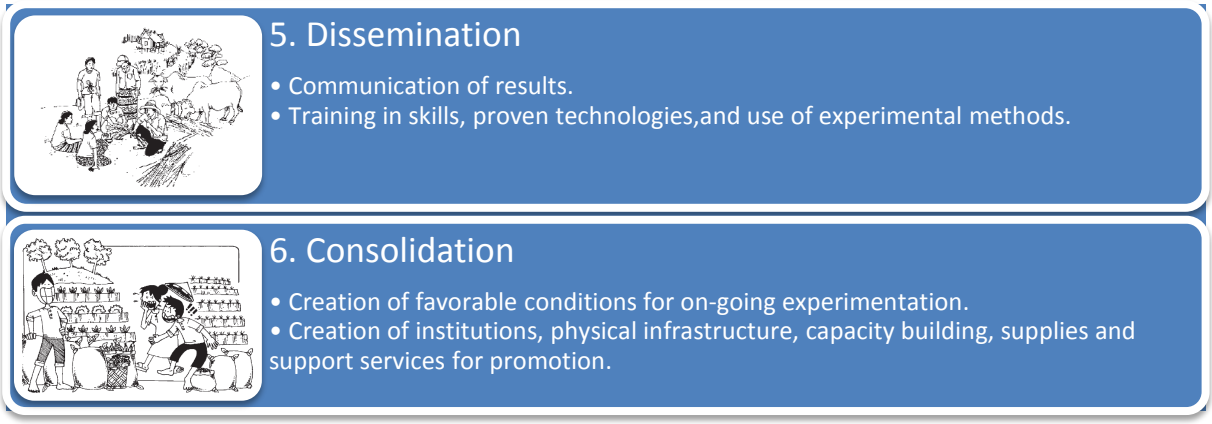


Figure 1: Sequence of activities during a PTD-project (ZAHUMENSKY 2013, adapted from CRAMB 2005:145ff.; BEHERA & SHARMA 2008:24ff.; SALAS et al. 2003:89ff.; HORNE & STÜR 2005:172ff.; HORNE & STÜR 1998:2ff.; BESSETTE 2005:94ff.; LINQUIST et al. 2005:58ff.)

2. How to use this manual

Participatory tools are especially designed to be applicable according the special features of local contexts. Each PTD-workshop is unique and what might have proved to be applicable in one village might not be useful in the neighbor village.

The here presented tools should be understood as flexible methods which can be modified and adapted according to target groups and local conditions. PTD is an on-going and open-ended process that improves by practice. Don't hesitate to develop new techniques. Therefore, this manual serves as an inspiration source and not as a rigid instruction guide. It aims at illustrating how a workshop can be tackled and what subtle group processes a beginner should pay attention to during different stages of a PTD-project.

3. What is PTD?

Participatory Technology Development is a form of informal small-scale *Farming Systems Research.* This research type focuses on improving small-scale farmers' production systems on household level and on reducing rural poverty. PTD's core objective is testing technologies under farmers' conditions, on farmers' fields in order to find locally adapted agricultural technologies for broad dissemination.

Participatory

What distinguishes PTD from other research approaches is the strong emphasis on local peoples' proactive participation during the experimentation process and the disclosure of local knowledge. Project participants should be the main actors and decision-makers during the research process which includes problem definition, trial design, the implementation of experiments, and the evaluation of results.

Technology

One premise of PTD is that informal experimentation and technology innovation are natural to farmers since they frequently have to adapt to an alternating environment. For this reason, particularly small resource-poor farmers are supposed to have full knowledge about the existing farming systems because they have experience in developing site-specific, often rain-fed and even sustainable *Low-External-Input and Sustainable Agricultural* (LEISA). This

knowledge (so-called *Indigenous Traditional Knowledge*) is also expert knowledge, and its inclusion is the base for a broad adoption of technologies. The consultancy of ITK assures that technologies emerge *from* farmers' needs and, hence, assures that innovations really *meet* farmers' needs. Technology adoption and dissemination is the proof for the success of a PTD-project.

Development

Despite the desired ownership of farmers formal scientists are not excluded in PTD. They are rather attributed the role of facilitators who assure that farmers' local experimental capacity is fully utilized and to link them to information and resources. This facilitation is challenging since in new technologies as an outcome on product level are usually as important as the improved experimental capacity of farmers as an outcome on process level.

4. How to plan a PTD-workshop?

An effective and successful PTD-workshop should be prepared carefully in terms of planning, preparation and implementation. You should schedule 3-5 days for the preparation of the workshop itself. The date and location of the workshop should be set 3-4 weeks in advance. Consider that you have to bring everything you need to the location (food, equipment).

Consider:

- How the participants will reach the location (shuttle service)?
- The time slot of participants (heavy workload of farmers)?
- Plan enough breaks.
- Plan time-buffers for every tool (participants need time talk and to get connected).
- Vary the tools (methodologically and in terms of aspiration level).
- Don't overcharge a workshop session (less is more).

Your attitude:

- Internalize that you are facilitator and not leader or authority.
- Moderate group processes through open questions. (*Who? How? What? Why?*)
- Observe and listen and be patient.
- Be aware of biases (gender sensitivity).
- Be enthusiastic and humorous.
- Encourage participants.
- Synthesize discussions and major workshop results into a few words. Always check to see that the audience agrees with your summaries.
- Be prepared that there will be changes in your workshop program (be flexible with respect to content and methods).

Facilitation:

Facilitators (usually professionals from outside) have the role to observe, assess, and analyze group process while oscillating between initiating and facilitating in the foreground or observing and assessing in the background. In doing so, they facilitate the transformation of unequal relations of domination and subordination between outsiders (researchers/ development practitioners) and insiders (local people) as well as between insiders through facilitating and enabling local people to express and enhance their own contextual and specific knowledge.

Step 1: What is the purpose of the workshop / what should the participants be enabled to after the workshop?

- To improve collaboration between farmers and researchers / extension workers.
- Innovative technologies as an outcome.
- Participants should be able to test technologies independently (increased experimenting capacity).
- To disclose indigenous traditional knowledge.

Step 2: Why are the questions which the workshop addresses relevant for the facilitators?

- Learning from participants is crucial. Without local knowledge innovative technologies might not address the participants' needs and hence, might impede the adoption and dissemination of new technologies.
- Facilitators need to know what participants want work on.

Step 3: What skills, knowledge and attitudes are we trying to develop during the workshop?

- To obtain detailed knowledge about the on-farm experiment.
- To inform participants about possible benefits of PTD.
- To get familiar with participatory tools and potentials.
- To empower participants for self-dependent experimentation.

Step 4: Who are the participants?

- Resaerchers, farmers, extensionists.

Step 5: Who will realize the workshop?

- Resaerchers, extensionists, other practitioners.

Step 6: When is the workshop to be held and how long will it last?

- 17th July, 20xx for 1 day (9 a.m. - 16. p.m.)

Step 8: Which methods should be used (workshop program)?

Time	**Activity**
9.15 - 9.30	Welcoming
9.30 - 11.00	Tool 1
11.00 - 11.15	Short break, snacks, coffee
11.15 - 12.15	Tool 2
12.15 -13.15	Lunch break
13.30 - 15.00	Tool 3
15.00 - 15.30	Final Discussion
15.30 -15.45	Workshop closure (outlook following workshop(s))

Step 9: With what will we do the training? (Budget and physical resources)

- Research institute/ local partner organization pay travel costs, lunch and offer other materials.

Step 10: Which steps are necessary to monitor and to evaluate the workshop (follow up)?

- Participatory evaluation of the workshop day (with points or informal discussion).
- Evaluation among facilitators after the workshops (every evening).
- Use the evaluation in order to adapt the PTD-project and to adjust PTD-tools.

5. Participatory Tools

There is a variety of participatory tools and they can be applied in diverse contexts. Especially untrained users might feel overcharged with this methodological pluralism. Thus only a few selected participatory tools are presented in this manual for illustration purposes. Narrowing focuses and didactical reduction are general strategies of participatory practice. Keep in mind that this proceeding during the application of PTD-tools also implies a reduction of complex realities.

Very commonly participatory tools are categorized according to their presentation method, e.g. whether it is a map, a diagram or a matrix. Despite being a suitable categorization of tools, a sorting according to different situations in a project cycle appears more helpful for newcomers in participatory research practice since it supports the independent and self-reliant selection of tools of a workshop. At this, one fundamental principle is that facilitating participatory processes (mainly group formation and dynamics) is of the same weight as the facilitation of technology generation.

The following categorization of participatory tools according to project stages is not binding and many tools can be applied in various situations depending on the context and issue that are to be elaborated.

5.1 Diagnosis/ Design

In the initial stage of a project cycle local problems and needs should be identified in a first step. Thereupon, activities of a later project stage need to be planned. Consequently, tools that are suitable for the assessment of needs and problem diagnosis are required.

The purpose if such tools are:

- To work out key questions and aims of the project.
- To make the project activities and aims transparent.
- To create a base for (participatory) evaluation and impact monitoring at a later project stage.

5.1.1 Historical Diagram

Materials:	1 big sheet of paper, on the ground or on the wall (adhesive tape or thumbtacks!), thick pencil or colored pencils
Time:	Approx. 1 hour
Purpose:	Visualization of topics over a certain timespan

Purpose of the tool

By help of a *Historical Diagram* the development of different topics during a certain timespan can be visualized. Therefore, a matrix is drawn with an axis where different time intervals are listed (e.g. 1950 – 2015). On the other axis topics of interest are lined up, e.g. different parameters of the regional living conditions such as electricity, water availability, seeds, farming practice, mechanization of agriculture, compost/ farmyard manure (FYM), application of pesticides, etc..

For each time interval there can be drawn the respective status quo of the topic by means of symbols (f.i. one light bulb for low electricity availability and three light bulbs for comprehensive electricity supply). By the end of the tool the developments as well as the quality of changes (improvement or deterioration) can be identified at a glance.

Image 1: Preparing a *Historical Diagram* (ZAHUMENSKY 2010)

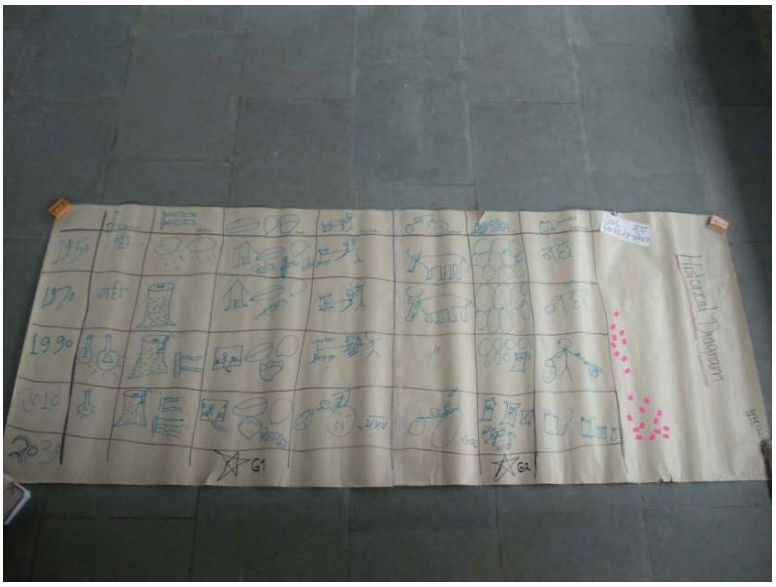


Image 2: *Historical Diagram* (ZAHUMENSKY 2010)

Stepwise instruction

1. Start the diagram with the drawing of the time span.
2. Start asking casually about changes of e.g. living conditions during the past years or decades. The participants will give you a notion about the time span they would like to analyze.
3. Before drawing the time span get the limits of the span as well as its subdivision into up to 5 intervals confirmed from participants' side (intervals of 1, 5, 10 or 20 years).
4. By talking about changes pay attention to criteria or parameters of the changes. These parameters you suggest drawing on the other axis of the diagram. Get the parameters confirmed by the participants ("Should I draw this topic in the axis now?" "Does

everybody agree if I draw this topic in the axis?"). If any participant suggests drawing in another way encourage him or her to draw!
5. Collect 5 – 10 criteria.
6. Continue asking systematically about the status quo of every criterion per time interval.
7. By the end of the diagram summarize main improvements or deteriorations of developments. Even better if you let the participant(s) summarize obvious developments.

Tips and tricks

- ✓ Ask open questions to get into the topic and then ask for details "What has changed compared to former times? How do you remind this topic in your childhood? How did your grandfather or grandmother do this? What exactly changed (quality or quantity)? Did it change only in your village or was it a widespread regional or even global change? Is the change caused by natural or human factors?"
- ✓ Search for consensus among participants in case they don't agree about changes.

5.1.2 Transect Walk

Materials:	1 big sheet of paper, on the ground or on the wall (adhesive tape or thumbtacks!), thick (colored) pencils
Time:	approx. 1.5 hour
Purpose:	Exploring local conditions by observing; visualization of observations

Purpose of the tool

The *Transect Walk* is a systematic walk along a defined route (transect) across a selected area together with local people. It serves for exploring local conditions such as land use by observing and producing a transect diagram that visualizes major observations. The *Transect Walk* can be considered as a kind of *Field Visit*. The tool simplifies the comparison of various observations and highlights special features, resources, uses, problems and potentials of different zones.

Preparations

- ✓ Determine the transect route and predefine segments of the transect.
- ✓ Make a test walk and note your main observations (these observations will help you to asking participants about their observations).
- ✓ Imagine the transect as a profile or a linear sequence of observations (drawing a line, not a surface).
- ✓ Wait until you begin to draw. Make a draft if necessary.
- ✓ Don't forget to draw geographic information such as cardinal directions, expanse of the transect and topography (but: visualization before accuracy!)

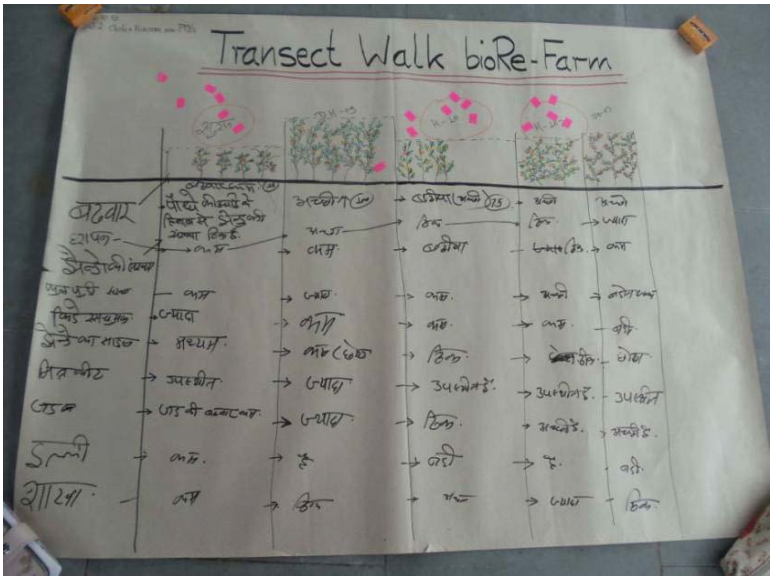


Image 3: Working out a *Transect Walk* (ZAHUMENSKY 2010)

Image 4: *Transect Walk* (ZAHUMENSKY 2010)

Stepwise instruction

1. At the starting point of the transect you ask the participants for any kind of observations across the first transect section. The participants will already inform you about their judgment of positive or negative observations (e.g. *degraded* land, or *healthy* plants, *rough* terrain).
2. By asking about negative or positive observations you can derive observation criteria or factors and causes for negative or positive observations (asking "Why is that being the case?"). Criteria/ factors can be soil, land use, trees, crops, livestock, etc.
3. Arrange and condense the parameters of observations as well as criteria by asking whether these can be summarized under one topic. Seek for an agreement and categorization of core observation parameters and core criteria.
4. Ask for problems, opportunities and solutions; facilitate discussion.
5. Now you can start to draw transect draft on the basis of the collected criteria and general observations: observations on the horizontal axis and the criteria on the vertical axis. The judgment about the quality of the observation you can draw/ write below the

observations in form of a table. If the first column of the diagram is complete the first segment of the transect is ready.

6. Continue with the next segment.

Tips and tricks

- ✓ If the transect encompasses very different segments (forest, farmland, pasture, buildings) the criteria of the first segment might (partially) not be suitable for the other segments. Then you have to work out criteria for each transect segment.
- ✓ If the segments differ extremely you should generalize some few criteria already at the starting point so that the few general criteria are applicable for any segment of the transect walk. (This is also a reason why you should make a test walk across the transect beforehand!)
- ✓ Both axes can be drawn by help of symbols! (suitable when illiterate participants are prevailing)
- ✓ The transect can be done as historical transect that visualizes changes in land use patterns over time
- ✓ The route can also be selected by the participants.
- ✓ The transect is not appropriate for urban areas.

5.1.3 Direct Matrix Ranking

Materials:	1 big sheet of paper, on the ground or on the wall (adhesive tape or thumbtacks!), thick pencil
Time:	Approx. 45 minutes
Purpose:	Ranking of different parameters, i.e. placing them in order according to priorities

Purpose of the tool

The *Matrix Ranking* is an analytical tool that allows for the ranking of different topics according to specific criteria. A ranking unveils preferences of individuals or groups and the reasons for preferences. It can also identify the urgency of most pressing problems. During the preparation of the tool, parameters can be easily compared. The parameters and criteria are to be inquired during the development of the tool (short brainstorming). You can rank agricultural techniques, land use problems, the usefulness of animals or the preference of crop varieties, but also sensitive information such as household income (asking for the importance of different income sources instead of asking "How much do you earn?").

	Crop variety				
Criteria	**Crop 1**	**Crop 2**	**Crop 3**	**Crop 4**	**Crop 5**
Criterion 1	5	1	2	3	4
Criterion 2	4	1	2	3	5
Criterion 3	1	4	2	3	5
Criterion 4	5	1	2	3	4
Criterion 5	5	-	4	2	3
Total score	20	7	12	14	21
Rank	B	E	D	C	A

Figure 2: Model of a *Matrix Ranking* (adapted from THEIS & GRADY 1991:70)

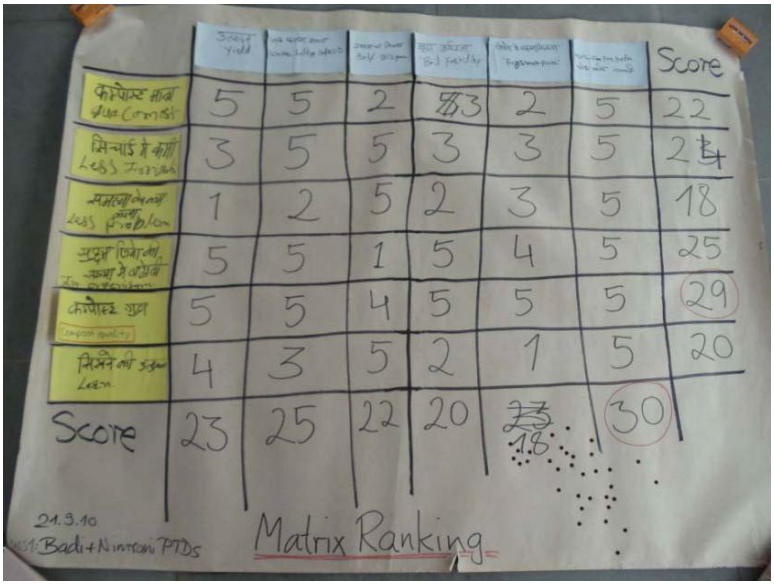


Image 5: *Matrix Ranking* (ZAHUMENSKY 2010)

Stepwise instruction

1. Make a brief brainstorming about important topics for the participants (5 minutes) (you can also skip this step and preselect a topic)
2. List 3 to 8 items on the horizontal axis (let the main items be confirmed by the participants: "Shall we select this item? Can we group these items to one core topic that is relevant for all participants?")
3. Ask why the topic is important: by this way you get the criteria for the selection of important topics (asking "What is good/ bad about each item? What else?")
4. List the criteria on the vertical axis (turn negative criteria into positive criteria: e.g. "vulnerable to pests" into "pest resistance")
5. Draw up a matrix
6. Agree on a scoring technique (5 items = 5 scores; 10 items = 10 scores). By scoring the criteria can be judged with regard to their relative importance for the listed topics (5 = best/ most important; 1 = worst/ not relevant);
7. Now you ask for each criterion which object is best/ most important, then next best/ important and so on; which is worst/ not relevant, then next worst/ not relevant?
8. By the end of the matrix con can calculate column and row sums
   → Those items and criteria with the highest score are most important
   → You can rank them according to declining scores (rank A, rank B, rank C, rank D)
9. Force a choice by asking: "If you could only chose one of these, which one would you chose?"
   → the favorite is highlighted at a glance.

Tips and tricks

- ✓ Usually one score can only be allocated once in a row. But if you permit multiple mentioning of scores you can also rank the criteria through building differing row sums. Priorities of criteria may also be important information.
- ✓ Ranking is suitable for individuals or groups. In groups the scoring happens through bargaining and consensus building. During an individual ranking you can facilitate rethinking the individual scoring by giving the interviewee a fixed amount of counters (e.g. 15 seeds or adhesive points). If the interviewee runs out of counters before he

reaches the last criterion per item he can change his initial allocation of counters before finalizing the ranking.

- ✓ Women may have other preferences as men. It might be interesting to separate the group into a male and female group, working out a matrix for each group and compare/ discuss different results in the plenum.

5.1.4 Pairwise Ranking

Materials:	1 big sheet of paper, on the ground or on the wall (adhesive tape or thumbtacks!), if applicable real-life samples such as fruits, thick pencil
Time:	Approx. 1 hour
Purpose:	To determine preferences and problems, to identify ranking criteria, easy comparison of priorities

Purpose of the tool

The purpose of *Pairwise Ranking* is the same as of *Matrix Ranking* (ranking of different topics according to specific criteria, i.e. placing items in order according to individual priorities or preferences). You can rank fruits, crops, vegetables, seeds, farming techniques, physical labor, etc. *Pairwise Ranking* differs from *Matrix Ranking* in the ranking technique. In *Pairwise Ranking* relevant topics are listed on two axes so that a matrix can be created. After that, the topics can be systematically weighed against each other and the respective weightier topic is written in the empty fields of the matrix. By the end, it is counted how often each topic has been mentioned whereupon a ranking can be made.

Stepwise instruction

1. Choose a set of problems/ topics that are important for participants, e.g. agricultural production or farming problems. The problems can be identified with help of a brief brainstorming and discussion in the group or they can be preselected from a previous discussion with a local key informant)
2. Choose about six most important items (e.g. farming techniques, tree species)
3. Note down each item and create a preference matrix (see below)
4. In case you have real samples place the first item pair in front of the interviewees and ask them to choose the more favored preference/ the bigger problem. Ask also for reasons of the choice and create a criteria matrix (see below).
5. Note down the answer in the respective box of the preference matrix:

BAnana	**MAngo**	**GUava**	**ORange**		**Score**	**Rank**
	BA	BA	BA	BAnana	3	A
		Ma	OR	MAngo	1	C
			OR	GUava	0	D
				ORange	2	B

Figure 3: Model of *Pairwise Ranking* (adapted from THEIS & GRADY 1991:68)

6. Note down the criteria in the criteria matrix by asking *"Is the preferred item/ problem more important than the other?"* Note down favorable and unfavorable reasons:

	Favorable	Unfavorable
Banana		
Mango		
Guava		
Orange		

Figure 4: *Criteria Matrix* (adapted from THEIS & GRADY 1991:68)

7. Place the next pair in front of the interviewees and repeat the comparison. Continue comparing all possible pairwise combinations.
8. Count the number of votes for each item together with the interviewees and note the score in the respective box of the ranking matrix
9. Transfer into a ranking
10. Check with the participants whether an important item was omitted and if so, adjust the matrix
11. Cross check the preference ranking by asking *"If you could only grow one vegetable variety, which one would you choose?"* This question helps to identify the highest preference or most pressing problem if several items score high.

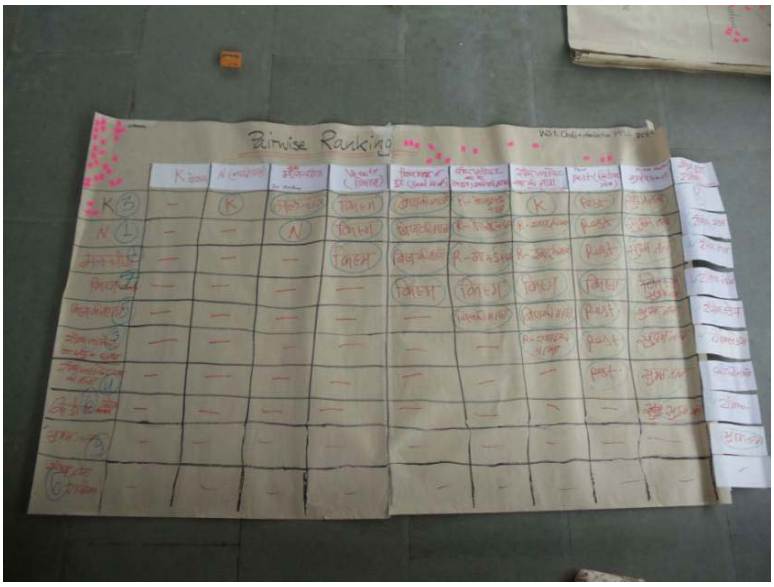


Image 6: *Pairwise Ranking* (ZAHUMENSKY 2010)

Tips and tricks

✓ Reduce the number of items on the ranking list to the minimum (about six items). If there are many items to compare this simple ranking technique might get long-winded. The participants will get tired and bored very quickly with the consequence that the results may be indiscriminate and less valuable.

5.2 Implementation/ Experimentation

The realization of informal experiments is the centerpiece of PTD. Farmers are supposed to be familiar with the procedure since they frequently have to test agricultural innovations due to alternating environmental conditions. Yet, they might not be familiar with the systematical experimentation in close collaboration with researchers and extensionists. Collaborative experimentation means testing new technologies based on farmers' criteria but improved with methodological suggestions from outsiders.

Tools of PTD-experimentation facilitate:

- Systematical observation.
- Measurement and reporting of results.
- Validation and scaling up of successful experiments (exchange of experiences).

5.2.1 Exchange Visits (Direct Field Observations)

Materials:	Sites such as plots on farms, markets, events
Time:	Approx. 1 hour
Purpose:	Direct observation of indicators to cross check findings, recording of observations, exchange and active engagement of participants, to train systematic observations skills, generation of on-the-spot questions, to get an informal setting

Purpose of the tool

Direct Observations/ *Exchange Visits* are an integral part of participatory (research) practice since they are essential for the linkage to reality. Yet, there might be the problem that unskilled observers misinterpret observations. Usually, local people are experts in their fields but may lack the skills for *systematic* observation. On the other hand, outsiders such as development experts or researchers don't have the *regional competence* to accurately interpret their systematic observations (lack of familiarity with the area and possible particularities).

During the field visit, researchers and target groups of a participatory research project come together for exchange and learning purposes. Furthermore, during a field visit various target groups can be united and, in this way, be given a platform for exchange. This facilitates the validation and dissemination of promising innovative technologies or farming techniques as a main objective of *Participatory Technology Development* (PTD).

The Objective of *Direct Observations*/ *Exchange Visits* is the systematic observation of any objects, processes, events, relationships, people, etc. and the systematic recording of these observations. The *Exchange Visit* is an important tool for cross-checking participants' answers.

- ✓ There are variables that are difficult or impossible to directly observe. Therefore, one has to observe indicators, e.g. house type as indicator for wealth of a household, leaf color as indicator for plant health, etc.
- ✓ Specify the object of observation and the major aim of the field visit.
- ✓ Think about methods for observation (site, measurement, indicators, and the type of recording the observations).
- ✓ Select measurement devices (tapes, scales or other devices to directly measure indicators in the field such as field size, yield weight, plant height).
- ✓ Select the recording type (notebooks, samples such as pest-infected crops, photographs).

Image 7: *Exchange Visit* (Direct Field Observation) (ZAHUMENSKY 2010)

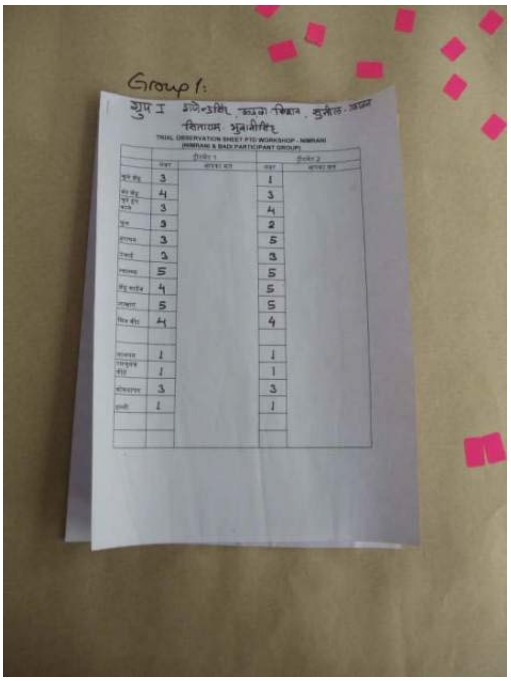


Image 8: Checklist *Direct Observation/ Exchange Visit* (ZAHUMENSKY 2010)

Stepwise instruction

1. Introduce the object of observation (e.g. baby trial field)
2. Clarify the aim of the observation (e.g. to compare the performance of different crop treatments)
3. Formulate hypotheses (there are successful vs. inefficient treatments)
4. Make a short brainstorming about indicators to observe
5. Draft a checklist together with the participants (either written or brainstorm very few indicators to be observed and reported orally)
6. If you decide to use a checklist hand out the checklist group wise (in small groups observations can be discussed more easily)
7. Ask the participants to walk through the field, to observe precise details and to discuss their observations within the group
8. Ask them to note down their observations. In case you want the participants to evaluate the quality of a crop, the performance of a soil treatment or pesticide, you can agree on

a rating scale (e.g. 1 for poor results; 5 for very good results) in order to judge the performance (see example checklist image 8). This simplifies and quantifies the *systematic* observation and comparability of findings.

9. Let the participants present, compare and discuss their findings in the plenum.
10. Ask the following questions:
    a. *What can we learn from our observation?*
    b. *What conclusions can we draw?*
    c. *Can we formulate new hypotheses?*
    d. *How could the observation be improved?*
11. Summarize main findings (e.g. best performing treatment)

Tips and tricks

- ✓ If you aim at a very systematic observation you can draft an observation checklist. It is recommendable to design this checklist together with participants. This raises the correct understanding and adequate use of the checklist. Besides, through the systematic observations via checklist different sites can be easily compared.
- ✓ If you aim at promoting exchange you can select a number of sites where different characteristic attributes of similar indicators can be observed. Target groups of different villages can exchange their observations or experience, and discuss problems and possible solutions.
- ✓ Practice participant observation (smell, listen, touch, and share in activities). The improvement of systematic observation skills among participants as well as between participants and researchers or development practitioners is more important than the accurate recording of findings.
- ✓ Mix the members of observations groups from different villages in order to increase exchange
- ✓ Change viewpoints (women's perspective, children's perspective)
- ✓ Use symbols for the recording of observations in case the participants are illiterate.

5.3 Evaluation

Evaluation is a very important step in PTD and in any other participatory process since it is a form of feedback that enables even quiet participants to comment on the participatory activities and to make suggestions for improvement. During an evaluation the facilitator or trainer should never get defensive. Reduce comments on feedback to the questioning if comments are unclear.

Evaluation tools ask questions such as:

- What was best about the workshop/ activities/ project stage?
- What was not good and should be changed or improved? How?
- What should we do differently next time?
- What other comments do you have?

5.3.1 SWOT Analysis

Materials:	1 big sheet of paper, on the ground or on the wall (adhesive tape or thumbtacks!) or board, thick pencil or chalk
Time:	Approx. 1.5 hours
Purpose:	Evaluation of **S**trength, **W**eaknesses, **O**pportunities and **T**hreats; strategic planning

Purpose of the tool

SWOT-Analysis is a simple but advanced tool for situational analysis, i.e. the evaluation of **S**trength, **W**eaknesses, **O**pportunities and **T**hreats. It provides valuable insights into potential and critical issues affecting a project through the collection of information about internal and external factors. In short, SWOT helps to identify strong and weak points and where there is the need to improve.

The advantage of SWOT is its focusing on key issues, as well as the clear and simplified depiction of any situation. Usually, it is presented in form of a matrix while strengths and weaknesses represent internal factors that can be directly influenced, and opportunities and threats represent external factors where stakeholders can only anticipate and react to them. Furthermore, SWOT-Analysis serves as a method for strategy formation since it helps to identify future goals.

SWOT-Analysis can be used to:

- Explore possibilities for new efforts or solutions to problems
- Set goals
- Determine possible changes and improvements
- Facilitate decisions making at important project phases, e. g create an action plan
- Clarify directions and choices through the direct comparison of opportunities and threats.

Stepwise instruction

1. Introduce the SWOT method and its purpose
2. ask: *Where are we now, where can we go?*
3. Define the desired goal of your project activities together with the participants
4. Explain clearly the difference between strengths (internal factors) and opportunities (external factors) as well as between weaknesses (internal factors) and threats (external factors)
5. For each of the four areas ask until there is no more reply:

	Helpful to achieving the objective	Harmful to achieving the objective
Internal factors (attributes of the organization)	**S**trengths • *What do you do well?* • *What are your advantages?* • *How can you leverage the strengths to benefit our goals?* • *What valuable resources and assets do you have?*	**W**eaknesses • *What could you do better?* • *What could be avoided?* • *What necessary expertise/ skills do you currently lack?* • *What are you vulnerable?*

External factors (attributes of the environment)	**O**pportunities • *What opportunities do you know? Do you use them? If not, what prevents you from making use of them?* • *What could you utilize better in order to eliminating weaknesses or threats?* • *Where are the good opportunities?* • *How can you use potential opportunities more efficiently?*	**T**hreats • *What obstacles are evident?* • *What is blocking your progress?* • *Are there any conditions affecting your financial viability?* • *Will new developments in technology seriously affect you?* • *Could any of your weaknesses harm or completely incapacitate your abilities?*

Figure 5: Matrix of a *SWOT Analysis* and related questions (adapted from FAO 2014; UNIVERSITY OF KANSAS 2014)

Tips and tricks

- ✓ Keep in mind that the purpose of a *SWOT* is to reveal positive forces and potential problems that need to be addressed. This helps you to summarize insights.
- ✓ It also helps to conduct the *SWOT* analysis in clear steps if you start with looking back in time (strengths and weaknesses), before moving on to looking forward (opportunities and threats).
- ✓ Reduce the listing to the minimum.
- ✓ Only make a *SWOT* analysis if you intend to utilize the findings and objectives.
- ✓ You can first make a brainstorming with the participants and then narrow down to the four *SWOT* areas through discussion.
- ✓ The more stakeholders you involve the more valuable your analysis will be.

5.3.2 Impact Diagram

Materials:	1 big sheet of paper, on the ground or on the wall (adhesive tape or thumbtacks!) or board, thick pencil or chalk
Time:	Approx. 45 minutes
Purpose:	Listing of advantages and disadvantages of a topic; evaluation of impacts of activities

Purpose of the tool

Impact Diagram is a very simple evaluation tool that contrasts positive and negative impacts of a topic. Participants are asked to list positive and negative impacts of a research activity or of a project outcome. The length of the listed impacts clearly visualizes whether positive impacts outweigh negative impacts or vice versa. By the end, the diagram displays a classification of results and allows for the comparison of intended objectives and actual impacts. The base for project monitoring and possible course corrections is created.

Stepwise instruction

1. Delimit the evaluation scope. (*What should be evaluated? Why should it be evaluated?*)
2. In order to facilitate group discussion you may divide the participants into small working groups. The groups can treat similar or different topics.
3. Prepare the corresponding number of diagrams for each working group or create them together with the participants in the plenary.

4. Introduce the topic or the activity that should be evaluated: *During the last weeks/ months you have realized certain activities. Now it is time to judge the impacts of these activities…*
5. Draw a circle in the center of the sheet of paper and ask the participants: *What do we want to evaluate?*
6. In the circle you note the topic or activity that is intended to be evaluated.
7. Ask why the topic should be evaluated (= comparison of objectives and results).
8. Ask the participants: *What is good and what is bad concerning the topic/ activity?*
9. Draw several lines at the left and at the right margin of the circle.
10. Mark a "+" for positive impacts/ advantages on the one side and a "–" for negative impacts/ disadvantages on the other side of the circle.
11. Split the participants into small working groups.
12. Ask the working groups to discuss the PROS and CONS and to list them at the respective diagram side (written or with symbols).
13. Ask the participants of each working group to choose a speaker who afterwards presents the results of the diagram in the plenum.
14. Give space for discussion in the plenum during the presentations of the working groups.
15. Summarize main findings and contrast different diagrams, especially if the diagrams show a varying predominance of positive or negative impacts (see image 9).

Image 9: Comparing *Impact Diagrams* of different topics. (ZAHUMENSKY 2010)

Tips and Tricks

- ✓ You can preselect the topics or define them together with the participants.
- ✓ Develop the diagram together with the participants (explain the diagram while drawing it).
- ✓ If you intend to evaluate a farming technique (e.g. a soil treatment, crop variety, or crop performance) you can realize the diagram in situ as a form of *Field Visit*. In this way participants are given the opportunity to observe and to analyze the results again.

5.4 Dissemination/ Consolidation

Once an agriculture technology proved to be promising in the context of a small scale PTD-project it should be spread on a large scale. *Farmer-to-Farmer Extension* (e.g. *Farmer Field Schools*) is a cost-effective approach to extend innovate technologies especially to remote areas. It is a highly effective way of spreading farmers' own ideas and encouraging other farmers to try out new technologies on a voluntary base. One should be aware that this process can only be facilitated indirectly. Yet, PTD-facilitators can identify farmer innovators and encourage them to share their experiences. PTD can serve for the capacity building of such farmer multiplicators by providing spaces for exchange and extension among peers.

Besides the support of improved extension services PTD-practitioners and related (research) institutions can promote technology dissemination through the creation of open platforms for broad exchange such as a PTD-exposition.

Dissemination tools pursue the following objectives:

- To reach the most local people as possible even in remote areas.
- To institutionalize communication channels for the reporting of results.
- To improve the interest in experimenting and related skills (e.g. observation and experimental methods).
- To demonstrate the proof of benefits of participatory experimentation with new agricultural technologies (validation and consolidation of PTD as a self-running and on-going process).
- To increase collaboration and trust.

5.4.1 PTD-Exposition

Materials:	Various big sheets of paper, adhesive tape or thumbtacks, Flip Charts, thick pencils or chalk, tables, exhibits (products of the PTD-project), sufficient premises
Time:	Approx.1.5 hours for the exposition; 2-3 days for the preparation
Purpose:	Summarizing PTD-results; dissemination of promising technologies; team building and broad exchange across village borders

Purpose of the tool

A *PTD-exposition* offers a platform for broad exchange and discussion about PTD-experiences across village borders at the end of a PTD-project cycle. Furthermore, it increases the team spirit among PTD-farmers, sensitizes for the potential of local indigenous knowledge and for the power to induce change through participatory experimentation.

Special preparations

1. Make a brainstorming about main outcomes and experiences of the PTD-project. (*What are cornerstones? What are essential learning contents? Successes and failings?)*
2. Select main topics and results for dissemination (e.g. promising technologies, experiences with experimentation, PTD-products for comparison, the assessed needs and problems of local people, the purpose of PTD, motives, components and milestones of the PTD-research, sustainability issues, etc.)
3. Visualize these topics on big sheets of paper using images, colors, product samples, etc.
4. Summarize the topics on information boards.

5. Use the tables to arrange PTD-samples such as cotton bolls, mung beans, wheat grains, vegetables, herbs, etc. for comparison of e.g. crop yields and crop qualities of predominant farmers practice vs. innovative technology practice)

Stepwise instruction

1. Arrange tables with information boards.
2. Give the participants time to walk around the exposition, to stop at the table of interest or to discuss exhibits.
3. Animate the farmers to have a look at the information boards and tables with exhibits.
    a. *What do you see? What are the major PTD-results?*
    b. *Judge the PTD-results* (samples)!
    c. *How was the situation before?*
    d. *What are the benefits of PTD?*
    e. *Where are obstacles of PTD and how can they be overcome?*

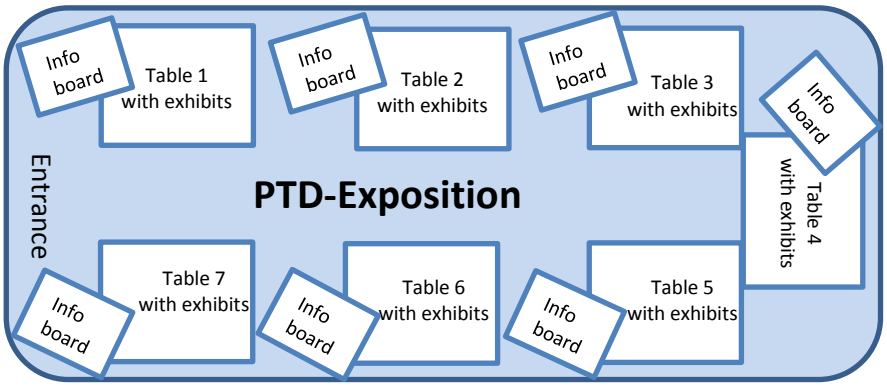


Figure 6: Arrangement of a PTD-Exposition (ZAHUMENSKY 2014)

Image 10: PTD-products under scrutiny (ZAHUMENSKY 2010)

Tips and tricks

- ✓ Provide sufficient staff to explain the PTD-stations and to respond questions (at the best 1 person in charge per table).
- ✓ Invite extensionists to participate at the PTD-exposition since they are the linking element between researchers and community members.

- ✓ Invite local community members who did not participate in the PTD-project to join the exposition. The facilitators and PTD-participants can present their PTD-results to the visitors and by this way may facilitate the promotion of PTD and dissemination of promising technologies. Furthermore, the PTD-participants can increase their training skills as well.
- ✓ Invite all persons available who are responsible for the PTD-project because the exposition informs about project activities and progresses.

6. Challenges and pitfalls of PTD

PTD-conception and methods are related to ethnographic fieldwork. Therefore, socio-cultural skills play a vital role during the application of PTD-tools. There are several points of criticism. Sometimes, PTD-tools are limited due to simple practical constraints: Farmers often face difficulties in identifying research questions for the PTD agenda or they point out research questions that are not manageable by research due to political limitations or uncontrollable factors such as climate. Apart from that, farmers' research questions may be of minor importance for research purposes. In this case PTD-facilitators are asked to find tangible compromises.

6.1 Strong technology orientation

PTD is a mixture of natural and social science approaches with competing research paradigms. Agricultural science approaches focus on improving local livelihoods through more effective technologies and improved research about technologies. Social science approaches rather emphasize on improving social, political and economic frame conditions that constrain the initiation of social change. PTD can be interpreted in a more technical or in a more social way. Since in agricultural science natural science approaches prevail, the risk to reduce PTD to technology generation is high and procedural aspects such as empowerment and capacity building might be neglected.

6.2 Technical use of PTD-tools

PTD-practitioners often find themselves in a dilemma because they have to balance different objectives, i.e. meeting the requirements of research efficiency and to achieve equity and empowerment. This is a mammoth task which overcharges especially untrained facilitators who therefore tend to focus on the technical application of PTD instruments since they fear to apply them wrongly. Yet, a technical application also tends to focus on technology generation instead of facilitating group processes for local empowerment, self-organization and ownership. In the long run, the negligence of group formation processes reduces the potential for technology dissemination and PTD consolidation.

6.3 Clash of knowledge systems, biases and pseudo participation

It might be difficult for external scientists to accept local farmers as peers and experts because of farmers' potential illiteracy and possible mythic knowledge system. Researchers might consider themselves as teachers with superior knowledge and hence they might (wittingly or unwittingly) assume to have the more valuable knowledge. This entails the risk to predefine or to direct outcomes. Such behavior would lead to farmers' pseudo-participation since decision-making is not devolved to them. Hence, PTD would become a farce.

6.4 Selection of PTD-participants and power influence of the already powerful

Seeking especially for the inclusion of the poorest and marginalized people is honorable but may be unrealistic due to the lack of access to local agricultural resources of the extremely poor, marginalized or landless. PTD is not practicable for those people since they lack the parcel of land that is necessary for on-farm experimentation.
After all, women are also very often excluded as their agricultural contribution/ decision making power might be underestimated.

6.5 Group dysfunctions

Participatory processes are group processes such as e.g. exploring questions, exchanging ideas, discussing statements, bargaining for consensus-building, and finding creative solutions for local problems. These positive group functions are a precondition of the effectiveness of participatory methods since they create a positive sum synergy that motivates, inspires and enables all people involved to contribute actively to problem-solving activities.

Contraindicated group dysfunctions (groupthink, group pressure) are subtle and may lead to reinforcement of undesired power relations within a workshop group. For this reason PTD-practitioners should pay special attention to negative group dynamics. Some examples are:

- During group discussions participants tend to take collective decisions instead of those they would have taken individually.
- Participants may take decisions that they have second-guessed is what everyone else wants. Thus, the collective reality about actual desires can be misperceived.
- The description of local needs can actually be shaped by local perceptions of what the research institute or local agency could be expected to deliver.
- Powerful group members can manipulate decisions for their own interests and hence, unequal power relations can be reinforced (domination of local elites).

Due to the susceptibility to the manifestation of unfavorable power structures PTD-facilitators are asked to encourage introverted participants and women for participation.

7. Bibliography

BEHERA, U. & A. SHARMA (2008): Modern Concepts of Agriculture: Farming Systems. New Delhi: Indian Agricultural Research Institute.

BESSETTE, G. (2005): Participatory Development Communication: Reinforcing the Participatory NRM Research and Action Process. In: GONSALVES, J. et al. (Eds.): Participatory Reserach and Development for Sustainable Agriculture and Natural Resource Management: A Sourcebook (Vol. 1: Understanding PR+D). Laguna, Ottawa, pp. 94-103.

CHAMBERS, R. (2011): PRA, PLA and Pluralism: Practice and Theory. In: P. REASON, & H. BRADBURY (Eds.): The SAGE Handbook of Action Research. Participative Inquiry and Practice (2nd reprinted ed.). London [a.o.]: Sage.

COOKE, B., & KOTHARI, U. (Eds.) (2004): Participation. The New Tyranny? (3rd ed.). London, New York: Zed Books.

CRAMB, R. (2005): Rethinking the Development, Dissemination and Adoption of Agricultural Technologies. In: GONSALVES, J. et al. (Eds.): Participatory Reserach and Development for Sustainable Agriculture and Natural Resource Management: A Sourcebook (Vol. 1: Understanding PR+D). Laguna, Ottawa, pp. 145-150.

FAO - FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (2014): EAF Planning and Implementation Tools: SWOT (strength, weaknesses, opportunities and threat) Analysis. (http://www.fao.org/fishery/eaf-net/eaftool/eaf_tool_45/en, accessed 8/1/2014)

HAVERKORT, B.; VAN DE KAMP, J. & A. WATERS-BAYER (1996) (Eds.): Joining Farmers' Experiments (repr. ed.). London: Intermediate Technology Publications. London: Intermediate Technology Development.

HORNE, P. & W. STÜR (1998): Participatory approaches to agricultural technology development in sloping lands (Vol. Extension bulletin 462). Taipei City, CN: Food and Fertilizer Technology Center (FFTC).

HORNE, P. & W. STÜR (2005): Developing Agricultural Solutions with Smallholder Farmers: How to Get Started with Participatory Approaches. In: GONSALVES, J. et al. (Eds.): Participatory Reserach and Development for Sustainable Agriculture and Natural Resource Management: A Sourcebook (Vol. 1: Understanding PR+D). Laguna, Ottawa, pp. 172-180.

LINQUIST, B.; KEOBOUALPHA, B. H. & C. LAI (2005): Upland Research in Lao PDR: Experiences with Participatory Research Approaches. In: GONSALVES, J. et al. (Eds.): Participatory Reserach and Development for Sustainable Agriculture and Natural Resource Management: A Sourcebook PR+D (Vol. 3: Doing PR+D). Laguna, Ottawa, pp. 58-65.

NEUBERT, D. (2000): A new magic term is not enough. Participatory approaches in agricultural research. In: *Quarterly Journal of International Agriculture,* 39(1), pp. 25-50.

SALAS, M.; JIANCHU, X. & T. TILLMANN (2003): Field Manual Participatory Technology Development (PTD): Linking Indigenous Knowledge and Biodiversity for Sustainable Livelihoods (2nd printed ed.). Kunming: Yunnan Science and Technology Press.

SELENER, D. (2005): Definitions, Assumptions, Characteristics and Types of Farmer Participatory Research. In: GONSALVES, J. et al. (Eds.): Participatory Research and Development for Sustainable Agriculture and Natural Resource Management: A Sourcebook (Vol. 1: Understanding PR+D). Laguna, Ottawa, pp. 5-15.

THEIS, J., & H. GRADY (1991): Participatory Rapid Appraisal for Community Development. A Training Manual Based on Esperiences in the Middle East and North Africa. London: International Institute for Environment and Development (IIED).

UNIVERSITY OF KANSAS (2014): Community Tool Box: Section 14. SWOT Analysis: Strengths, Weaknesses, Opportunities, and Threats. (http://ctb.ku.edu/en/table-of-contents/assessment/assessing-community-needs-and-resources/swot-analysis/main, accessed 8/1/2014)

ZAHUMENSKY, Y. (2013): Evaluation of Participatory Tools. Case Study about *Participatory Technology Development* (PTD) in Central India. Unpublished Masters Thesis; University of Tübingen/ Research Institute of Organic Agriculture (FiBL).