Technische Universität München

Wissenschaftszentrum Weihenstephan

Thema:

Participatory evaluation of farmers' perceptions about impact from Farmer Field Schools

Case study Province San Miguel, Peru

Hausarbeit zur Erlangung eines Diploms als Ingenieur der Agrarwissenschaften

Oktober 2001

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Introduction

> *"Development is not by blueprint but by a flexible and adaptive learning process. To achieve reversals on a massive scale is now perhaps the greatest challenge facing the development professions"*[1]

There were many approaches in the last 50 years, which tried to promote rural development. The trend in the 50's until beginning of the 60's was *Community Development* approach. After that and until the mid-70's the *Green Revolution* development was seen as the solution of food security and rural poverty. From the mid-70's until mid-80's the international development agencies worked with *Integrated Rural Development*. Since the mid-80's the aim is to improve institutional structures, the support of self-help end of capacity of organization.[2] But some aspects from the 'new' seemed to be 'old'. At least persisted the question if the new approach can succeed in those domains where the old one had failed.

Farmer Field School is an approach to rural development based on handing over information, which can be transformed by farmers in knowledge. This knowledge is a resource, which can be used by farmers to improve their own situation in a self-reliant way. Therefore, Farmer Field School could be an alternative to generate a sustainable rural development in poorer areas.

Moreover, this approach is has a participatory character that takes into account indigenous knowledge and local needs to support development processes. This considering development like pointed out by *Chambers* as *"not movement towards a fixed goal but continuous adaptation to maximise well-being in changing conditions."*[3] It is a continuous adaptation because needs and knowledge are context bound. They change in accordance with geographical location and also over the time. This signs Farmer Field

[1] Chambers, R. (1993): Challenging the professions – Frontiers for rural development – London, p. 1

[2] Wissenschaftlicher Beirat beim Minister für wirtschaftliche Zusammenarbeit (1992): Grundsätze und Schwerpunkte der deutschen Entwicklungszusammenarbeit in den 90er Jahren – BMZ (ed..): Forschungsbericht des Bundesministeriums für wirtschaftliche Zusammenarbeit Vol. 102, München/ Köln/ London, pp. 135-136 and also Nohlen, D. (1980) (ed.): Lexikon Dritte Welt, Baden-Baden, p. 216

School as a learning process. In this learning process farmers play an essential role, They are not just subjects adopting plans developed by engineers, but an active part of development, implementation and evaluation of these plans.

This case study works out a qualitative evaluation of Farmer Field School activities evolved by the International Potato Center in Northern Perus. The evaluation is part of a bigger impact assessment of Farmer Field School's activities in their target areas there. Main goal of the study is to get farmers' perception about the impact of the schools after the first years of experience in Peru. The nature of the study subject – farmers' perception – claims for methods which can get the whole complexity of the context of participating farmers, the motivations of their statements as well as the meaning of them. Qualitative methods seem to be the most adapted way to achieve this goal. Nevertheless, it is surely not an easy way to accomplish it. Many adepts of statistical, quantitative approaches are still criticizing qualitative research.[4] *Chambers* pointed out that the more methods rely on counting and statistics the more they endure, first because they are useful but also because they provide psychological security for those who practice them.[5]

The usefulness of qualitative research concerning this case study as well as its whole theoretical framework is presented in ***Chapter 1***. That includes in addition to the qualitative research approach the Grounded Theory from *Strauss* and participatory methodology to manage the research on the field. Case related information is presented in ***Chapter 2***. These concern institutions involved in Farmer Field Schools' planning and implementation, the Farmer Field School as approach and the description of the region, where case study was carried out. The ***Chapter 3*** describes the research process of the study, bringing detail related to study design, conduction as well as the aspects that constraint it. ***Chapter 4*** brings display of data collected on the field concerning three different categories: benefits, organization and knowledge. That will be the starting point of the conclusions presented in ***Chapter 5***.

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[3] Chambers (1993), p. 10
[4] see discussion in Flick, U. (2000): Qualitative Forschung, Reinbeck bei Hamburg , pp. 10-12 and also Denzin, N. K./ Lincoln, Y. S. (1994): Introduction – Entering the Field of Qualitative Research – in: Denzin, N. K./ Lincoln, Y. S. (ed.) (1994): Handbook of Qualitative Research, London
[5] Chambers (1993), p. 4

1. Theoretical Framework

The following chapter will present the conceptual ground of this study. The most abstract level is the Grounded Theory, which determine the theoretical horizon of the study. The next point is the approach selected to investigate reality, which can be embedded within conceptual limits of Grounded Theory. The last point explains the participatory methodology, which is the way to approach reality's' perception of stakeholders. Furthermore, key concepts will be clarified to allow a precisely understanding of the study.

1.1. Social relevant research - Grounded Theory, qualitative research, participatory methodology

The research process of these work bases on an adaptation of the Grounded Theory of *Strauss* and *Glaser*, applying a qualitative methodology and using participatory tools to carry out the research.

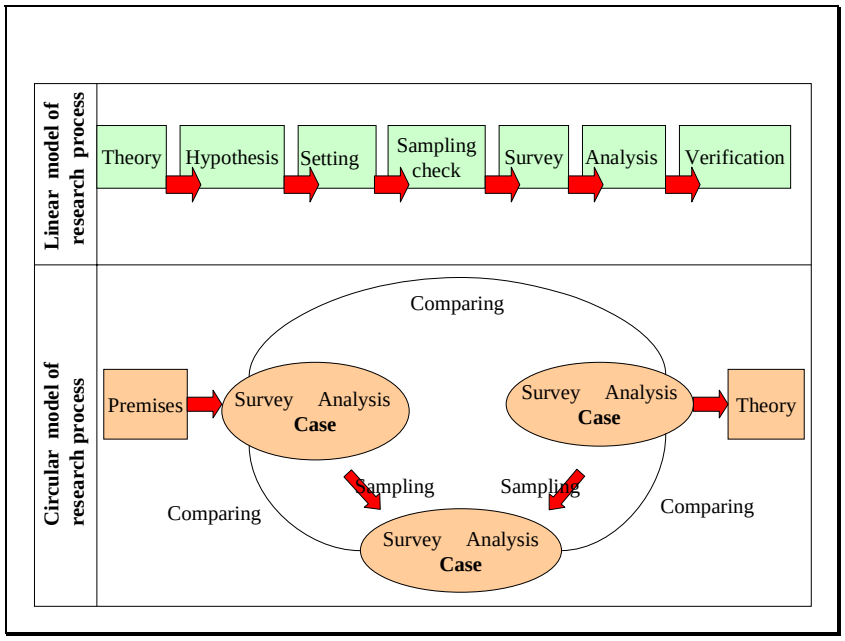
The Grounded Theory purposes the generation of theory while the research process through the interplay of data collected, contrasting with the traditional way of acceptance or denial of theories.[6] This signs the methodology of the Grounded Theory as a circular process: data collection – evaluation – theory building – data collection – evaluation – theory rebuilding and so on. Figure 1 compares the linear and the circular research process.

Characteristic of Grounded Theory is the use of everyday realities as empirical experience to create or adapt theories. That means theory shall ground on the reality of his subject of study and not on an abstract pre-defined theoretical assumptions. Moreover

[6] Strauss, A./ Corbin, J.: 'Grounded Theory Methodology – An Overview' – in: Denzin, N. K./ Lincoln, Y. S. (ed.) (1994): Handbook of Qualitative Research, London, pp. 273-275

Strauss/Glaser require the usefulness of the theory that results of the research process. A theory should bring findings and enlightenment to be used *de facto* and not just be a data exposition. The usefulness legitimates the whole research process.

Figure 1: Patterns of research process and theory



Source: Flick (2000), p. 61 (translated by author)

Strauss/Glaser elaborate some steps to the development of a Grounded Theory. The first step is the comparative analysis through *theoretical sampling*.[7] In a process of theoretical sampling the researcher does not start with a foregone universe of rules and conceptions like in a statistical sampling. The theoretical sampling does not work with an already known gross. The characteristics of the entirety are at first unknown. These characteristics will be identified after several sample turns. Even the sample size is not determined at the beginning of the research and it will be completed with the theoretical saturation of the theory. The theoretical saturation will be reached when new empirical data can be explained with the developed theory and do not contribute to changes and new elaboration of developed theory.

The next step is the coding of all collected data during the research process, what will help to form conceptions and a net of conceptions. This procedure is called *theoretical*

coding. The coding should be made from researcher him self.[8] *Wiedemann* suggests some codes: influent conditions of the phenomenon, interaction between actors, their strategy and tactics and also consequences of the phenomenon. The theoretical coding should go with *theoretical notes*, in which the researcher can register thoughts and hypothesis about the subject and also about the methodology that he matures during the research. The information resulting from coding and from theoretical notes should be integrated and compacted to *develop basic concepts*. At least of the coding process, information and developed concepts should be arranged making a *theoretical assort.* Not more than two main concepts should result of this process, which should be the cores of the research. At least a theory should be worked out of the whole data and be written, what is called *theoretical writing*.[9] Table 1 shows a systematization of the research steps.

Table 1: Development procedure of a Grounded Theory

Procedure	**Objective**
Theoretical sampling	Selection of study objects
Theoretical coding	Conversion of data in theoretical constructions
Theoretical notes	Development of hypothesis, methodological reflections, etc.
Development of basic concepts	Densification and integration of theoretical constructions in a theory
Theoretical assort	Assorting of theoretical notes for development of a theory
Theoretical writing	Summarizing of the theory for a publication

Source: Flick (1995), p. 442 (translated by author)

Strauss/Glaser demand the researcher should not use his preview knowledge during the research. He should keep the availability for new enlightenment and not be fixed in preview concepts and ideas. *Flick* affirms that this is very difficult, because each perception can just get a meaning taking into consideration our own frame of meanings. We need all our preview knowledge to structure our perception and that is why preview

[7] Wiedemann, P.: 'Gegenstandsnahe Theoriebildung' – in: Flick, U./ von Kardorff, E./ Keupp, H./ von Rosenstiel, L./ Wolff, S. (ed.) (1995): Handbuch Qualitative Sozialforschung, Munich, pp.441-442
[8] Wiedemann (1995), pp. 441-444
[9] Wiedemann (1995), pp. 442-444

knowledge can be seen as the premise of each research process.[10] It seems to be reasonable, to accept that nobody can delete his preview knowledge before beginning a study. Therefore preview knowledge about the subject will be considered in this work, nevertheless availability for new recognition or for another perspectives of the problem researched will be severely preserved.

The study subject "perception of the farmers about the FFS" is multifaceted and denotes the complexity of a social context: the context of rural population of San Miguel who visits the Farmers Field School. Therefore, it is necessary to use here a methodology, which can identify the whole complexity of the study subject as a social reality. A social reality is a construction that results of the interaction of the people living in it. Consequently, the best way to catch the perception of the farmers of San Miguel about his own situation after the introduction of the FFS is to take the farmer themselves as source of information about their social reality and the role of the FFS into this context. Considering the premises of the qualitative research, it is a very adapted methodology to investigate this kind of complex study object. The premises are like follows:[11]

⇒ Social reality is a composition of meanings and contexts, which are being continuously worked out from actors in their interaction. The meanings and contexts are being also continuously interpreted, modified and adapted in a constant process of social construction.

⇒ Social Reality is a process and is reflexive, because it is being daily renewed.

⇒ Just through their subjective meanings are objective live circumstances relevant for the real life. The subjective meanings are given through collective frames of meaning, which are constructed in social interaction.

⇒ Social reality has a communicative character, which allows the reconstruction of the constructions of this reality.

[10] Flick, U./ von Kardorff, E./ Steinke, I. (ed.) (2000): Qualitative Forschung - Ein Handbuch, Reinbeck bei Hamburg, pp. 271-272
[11] Flick et al. (2000), pp. 20-22

This theoretical background determines the practice of the qualitative research as a process:[12]

- ⇒ with a methodological assortment instead one single method;
- ⇒ that let possibility the researcher to adjust the methods according the study subject;
- ⇒ oriented on every day life and every day knowledge;
- ⇒ leaned on context of the study subject;
- ⇒ that wants to catch the plurality of the point of view of stakeholders;
- ⇒ requires the reflexivity of the researcher about his attitude and his perception on the field and accept this as an integrating part of the research;
- ⇒ has understanding as basis of enlightenment;
- ⇒ has openness as a principle;
- ⇒ that starts from a case analyze;
- ⇒ gets the construction of the reality as groundwork.

Taking into consideration the study subject of this work, it will be used qualitative research methods, adjusted for the farmers of San Miguel and for their context. It will be also taking into account the plurality of perspectives, trying to reach enlightenment trough the understanding of the construction of the farmers of their own reality. The methodology has openness as principle. That means, that it is no predetermined hypothesis. This will be worked out during the research process.

As strategy to identify farmers' point of view about FFS will be used participatory research tools in discussions with focus groups. *Richard Chambers* developed some participatory tools to conduce research by farmers in the *Participatory Rural Appraisal* - PRA. PRA is particularly popular by development agencies and organizations to make diagnosis before implementation of projects, but also to elaborate monitoring, evaluation and impact studies.[13] The participatory tools shall be used to work with groups and directly on the field or communities of farmers. They emphasize the local knowledge,

[12] Flick et al. (2000), pp. 22-24

[13] see Geilfus, F. (1997): 80 herramientas para el desarrollo participativo, IICA Holanda/ Laderas C.A. (ed.), San Salvador and also Guijt, I. (1998): Participatory monitoring and impact of sustainable agriculture initiatives: an introduction of the key elements – SARL Discussion Paper No. 1

experience and practices, what helps to get the perception of the farmers. Participatory tolls want to give voice to the stakeholders, in that case, the farmers of San Miguel.

Given voice to the stakeholders it is possible to understand their complex problems, helping them at the same time to analyze their own problems. Through their participation people train the identification, analyze and solution of their problems. That can supports and develops their self-confidence contributing to an empowerment of this people. Nevertheless, the participatory methods require the triangulation of data, using different tools by several information sources. That is necessary to verify the data and make results reliable. Considering the openness of the methods and the capacity to adapt them, it is not difficult to triangulate information from different actors connected with the study object.

The choose of discussion in groups to carry out the work were based on some arguments:[14]

- Discussion in groups is a way to collect opinions and perceptions.
- Discussions are sources of information and at the same time a learning process for stakeholders;
- The study subject in a discussion is the perception of stakeholders of social reality and of its changes;
- In a discussion the stakeholders try to make their arguments meaningful, what give the arguments validity.

Flick argues that the statements in the discussion in group in general carry a high content of reality, but from modest wide. The statements stand for subjective constructions of meaning from stakeholders, which can be analyzed and reconstructed from researcher.[15]

1.2. Definition of key concepts

Impact

[14] Flick et al. (1995), pp. 186-188
[15] Flick et al. (1995), p. 187

In the context of development project impact will be defined here as the effects of an intervention on its aim area, on the people involved and on its organizational context. Impact involves short-term outputs, medium term results and longer-term outcomes. Therefore, to conduct an impact assessment it must be defined what kind of impact will be messed: shorter-term, medium term or longer-term impact. A project impact assessment consists in track changes since the beginning of the intervention and find out the relationship between this changes and the intervention. It is important to try to identify also unexpected outcomes of an intervention. There is some ways to detect impact and the one that will be used here is the comparing situations *with intervention* and *without intervention*.[16]

Farmers' perception

Contrasting to a top-down approach, to get farmers' perception is part of a "bottom-up approach", oriented on users. *Campilan* argues that bringing users' perception into agricultural research and development is a determining factor to reach innovative, relevant, efficient and sustainable technology development.[17] Getting farmers' perception is possible to orient, reorient and monitor the effectiveness of an intervention in bringing benefits to target groups, in this context Andean farmer.

Benefits

Benefits should be understood as the changes brought from FFS to the farmers, which lead to a sustainable agriculture and development. Sustainability seen according the Brundtland-commission from 1987 a strategy to meet the needs of the present generation, without danger the possibility of future generations to meet their needs. Benefits should factors that broaden farmers' opportunities to reach secure livelihoods for themselves. They should increase their choice, enhance their capacity to control the constraining

[16] Guijt (1998), pp. 19-20
[17] Campilan, D. M. (1995): Learning to change, changing to learn – Managing natural resources for sustainable agriculture in the Philippine Uplands, Wageningen, p. 46

factors of their farming, animate them to experiment and research and reinforce the value of local knowledge.[18]

Knowledge

Knowledge is an effect of information, which were properly decoded, interpreted, re-coded and saved in a person's cognitive map. Knowledge is inside the mind from each person and it is accumulated during the time. Information is something that can be found outside the mind and can be consequently transferred, acquired and exchanged.[19] There is also pre-existing knowledge in each person, which will helps to select, pay attention to and interpret information.[20] In the FFS farmers will get information from extension workers and also from other farmers. A better knowledge is in the context of the FFS-farmers one of the contributing factors to decision-making about switching from conventional strategies to IPM. Here will be analyzed the perception of farmers about how many FFS did contribute to their knowledge acquisition.

Innovation

Innovation means here a process associated with a participatory research and development approach. In this process farmers and extension professionals work out opportunities and locally appropriated solutions to local problems.[21] Innovation should not be seen as a simply adoption from technology, which were transferred from extension workers to farmers. An innovation takes place when farmers adopt a new technology, which were developed from them working with extension workers in a cooperative process of discovery and learning. Technologies developed outside the social and agricultural context of farmers are likely to be inappropriate and farmers tend to not acceptance as innovation. While on the contrary, new technologies worked out with user participation tend to be tried and also accepted by farmers as innovation.[22]

[18] UPWARD (1997), p. 11
[19] Ortiz, O. (2001): La información y el conocimiento como insumo para el MIP – in: Revista MIP, September 2001, Costa Rica (accepted to publication)
[20] Ortiz (1997), p. 214
[21] UPWARD (1997), pp. 1-7
[22] UPWARD (1997), pp. 2-3

Sustainability

In the FFS context sustainability refers to capacity to keep working as an independent social organization also without the intervention of CIP and CARE. The FFS should become a framework to farmers to keep developing innovation and working out possibilities and solutions for their problems on their own.

2. Background

In this chapter it will be described the main institutional actors concerned with the Farmer Field School (FFS) in Peru – the agricultural research institution International Potato Center and the international non-governmental organization CARE. It will be also presented the Farmer Field School approach, its outcome and development process in Asia and later in Peru. Moreover, the section brings information about the insertion context of the FFS in Peru, in the department of Cajamarca end in the province of San Miguel.

2.1. The Centro Internacional de la Papa – CIP[23]

The International Potato Center, known as CIP (the Spanish acronym), was founded in 1971 and headquartered in Lima, Peru. It is a nonprofit scientific institution that works for the increase of the production and utilization of potato, sweetpotato and other roots and tubers in developing countries. CIP also promotes integral rural development and sustainable resource use in the world's mountain regions, where root and tuber crops are important for the nutrition and economy.

According to estimations of FAO the world population will grow about 26% in the next 30 years. About 80% of this growth will occur in developing countries.[24] Pressure on land, water and other natural resources is already intense and will increase. During the last generation technological advances in maize, rice and wheat helped feed millions of people. Unfortunately, the repetition of such another green revolution seems to be

[23] For more information see: CIP (ed.) (1999), International Potato Center (information paper), Lima
[24] in "Statistical Databases" from www.fao.org/ accessed 01/08/01

impossible. In spite of that, roots and tuber cultivation can become part of the solution of world's food security problems. They are a better source of digestible calories that any basic products like cereals as maize, rice or wheat. Moreover, roots and tubers are adaptable and can be cultivated in adverse conditions, where other cultivation would not grow.[25]

CIP includes internationally recruited scientists who investigate in more than 30 countries in partnership with national agricultural research systems, universities and non-governmental organizations (NGOs). The Center has regional offices in Kenya, India and Indonesia and has liaison offices in Ecuador, Uganda, Vietnam, China and Germany.[26] CIP's research program is distributed into 10 projects and three global and regional partnerships. A project leader responsible for research management leads each project.

The projects are:[27]

- Integrated management of late blight
- Uptake and utilization systems for improved potato production technologies in specific agro-ecosystems
- True potato seed (TPS)
- Integrated pest management for root and tuber crops
- Sweetpotato improvement and virus control
- Post-harvest quality, nutrition and market impact of root and tubers
- Biodiversity and genetic resources of root and tuber crops
- Integrated natural resource management in mountain agro-ecosystem
- Gene discovery, evaluation and mobilization for crop improvement
- Global commodity analysis and impact assessment for potato and sweetpotato

[25] CIP (ed.) (2000a), Informe Anual 1999, Lima, p. 12
[26] CIP (ed.) (2000b), Annual Report 1999, Lima, pp. 32-33
[27] www.cipotato.org/projects/portfolio2001.htm, accessed 14.07.01

The global and regional partnerships (GRP) are:[28]

- SIUPA – Strategic Initiative on Urban and Peri-Urban Agriculture
- GILB – Global Initiative on Late Blight
- CONDENSAN – Consortium for the Sustainable Development of the Andean Region

CIP benefits from governments, regional and international development organizations, foundations and other research institutions. The list below shows some of the most important donors ranked by level of contribution in 1999:[29]

- Swiss Agency for Development & Cooperation (SDC)
- International Bank for Reconstruction and Development (IBRD/ World Bank Group)
- United States Agency for International Development (USAID)
- Government of Japan
- Government of Germany, and others.

The Center is a member of the Consultative Group on International Agricultural Research (CGIAR), which is an association of government, public and private institutions supporting a network of 16 research centers worldwide.

The CGIAR is headquartered in Washington D.C. and is sponsored by the World Bank, the Food and Agricultural Organization of the United Nations, the United Nations Development Program and the United Nations Environment Program.

2.2. CARE-Peru

CARE was invited by the Peruvian Government 1970 to help in Peru respond to an earthquake emergency. The work changes toward development programs especially in

[28] www.cipotato.org/projects/portfolio2001.htm, accessed 14.07.01
[29] www.cipotato.org/org/donors.htm, accessed 18.07.01

four areas: Food Security, Agriculture Community Development, Small Economic Activity Development, Education, and Health, as well as response to emergencies when needed. More than one million poor people in Peru are reached from CAREs' projects, what means about 4% of the total population. The projects focus on sustainable improvements in the lives of project participants, which should continue after projects' ends.[30]

During the years in Peru CARE established a wide range of activities linked to community development. Nowadays the NGO works in 13 departments of the country with regional offices in some of them. CARE aims to strengthen of self-help capacity and to influence political decision at different levels, taking into consideration the needs of target communities.[31] The projects comprise enhancing of community water and sanitation, creation and strengthen of micro-enterprises, technical assistance and training of community health promoters, enhancing of rural potable water, implementation of credit lines for woman and small farmers, education, income generation, improvement of agricultural production and also enhancing of resources management.[32]

The existing work of CARE in northern Peru facilitates for CIP the access in this region to start an IPM project. With the project IPM-Andes CIP and CARE worked together between 1993 and 1996 to improve the IPM of potato crop focusing work on the *premnotrypes spp.* The collaboration was extended later like will be explained in the section about the FFS in Peru. Considering the long experience from CARE in community development activities in Peru, there was already a team of extension workers providing agricultural extension in the communities.[33] This gave support to the implementation work of IPM-Andes project, hence the collaboration with CARE was very important to the project.

[30] www.care.org/programs/country_profile.cfm?ID=103 accessed 26/07/01
[31] www.carepe.org.pe/care/p_02.htm accessed 26/07/01
[32] www.care.org/programs/country_profile.cfm?ID=103 accessed 26/07/01
[33] Nelson, R. / Orrego, R. / Ortiz, O. / Tenorio, J. / Mundt, C. / Fredrix, M. / Vien, N. V. (2001): 'Working with Resource-Poor Farmers to Manage Plant Diseases' – in: Plant Disease / Vol. 85 No. 7 – The American Phytological Society (ed.), p. 689

With the FFS CARE and CIP keep collaborating in the same region and will collaborate next time to improve the FFS approach. The experience of collaboration from institutions like CIP and CARE seems to be a good choice to improve effectiveness of development interventions and could be a example to be adapted in other places.

2.3. IPM: the challenge of working with knowledge intensive technologies

Ortiz discusses the definition of IPM and suggests that it is a combination of several pest-control alternatives. He defines IPM *"as the use of natural enemies, pest-resistant or tolerant varieties, cultural practices (some of them based on farmers' knowledge), legal control, and the suitable insecticides, in order to reduce pest damage to acceptable levels in a suitable way."*[34] These signs IPM as is not just a set of instructions, but as a methodology, which builds on knowledge. Like explained by the Chapter *Theoretical Framework*, knowledge is acquired through appropriately processed information.

Therefore, to ensure the use of an agricultural technological innovation like IPM, it is essential to find a way to facilitate farmers by acquisition of knowledge. In the project IPM-Andes CIP and CARE tried to ensure these providing farmers three different kinds of information, which should support the generation of knowledge about pests management: [35]

- **basic information** about biological aspects of insects specially of *premnotrypes spp., phtorimaea operculella* and *symestrichema tangolias* and also their relationship with potato cultivation;
- **applicable information** about practices of control of this insect pests;
- **complementary information** about details of the acquisition of inputs for IPM.

The different kinds of information reached the farmer, who has already his own pre-existing knowledge about pests' management. This pre-existing knowledge of farmer

[34] Ortiz, O. (1997): The information system for IPM in subsistence potato production in Peru: experience of introducing innovative information in Cajamarca Province, Reading, United Kingdom, p. 65
[35] Ortiz (2001), p. 4

interacts with new information in different ways: **generating** new knowledge, **modifying** pre-existing, **strengthening** appropriated knowledge and also **confusing** or creating incorrect knowledge, when information was misunderstood. When information is well processed, it becomes knowledge. This knowledge qualifies farmers to make better decisions and think independently.

In a study about information system for IPM *Ortiz* shows that in the experience of IPM-Andes in Cajamarca knowledge acquired about insects life cycle (basic knowledge) and about control practices (applicable knowledge) in interaction with their local knowledge increased their range of pest control alternatives, allowing them a better decision-making. Moreover, he pointed out that information should be presented in a gradual way to become knowledge: first the basic and subsequently the applicable information. This avoids confusions and creation of incorrect knowledge.[36]

Nevertheless, farmers are continually receiving several kinds of information from different sources – other farmers, family, other extension workers, insecticide sellers, radio, etc – which could also create confusing interaction. This indicates that farmers need a continuing transfer of information as long as their IPM knowledge is not solid. Knowledge is sure one of the different factors influencing farmers' decision making. But it can be seen as a production factor, when becomes solid and enhances the capacity of farmers to make better decisions.[37] Concluding, the IPM-Andes experience offered a response to the problem of how to bring knowledge intensive technologies like IPM, especially in regions with a lack of basic information like northern Perus. It provided a ground for further more complex initiatives like Farmer Field Schools.

2.4. The Farmer Field School as a response to work with knowledge intensive technologies

The transfer of technology dominated agricultural extension in most developing countries, especially during the Green Revolution. With use of a top-down approach agricultural extension brought to farmers technological packages including the use of

[36] Ortiz (1997), pp. 237-243
[37] Ortiz (1997), p. 243

pesticides as imperative. Consequences of that were farmers thinking they would have a complete crop loss without pesticides, and extension service were just providing information on what pesticides to use. Local knowledge was being eroded during that time.

Another result of the top-down agricultural extension approaches was, that farmers often did not adopt technologies for several reasons:[38]

- technologies were not appropriated under their conditions;
- investment were to high for the farmers;
- farmers were skeptical about to switch to an unknown practice with unknown results;
- conventional agricultural extension reached in general a group, which was better-off to begin.

After some years of experience there was evident that top-down approaches were not appropriated for poor farmers in developing countries. At the same time, many grassroots organization, NGO's and developing agencies have been experimenting with development from adapted technology and more effective agricultural extension, trying to reach poor farmers. These approaches based on "*the participation of target group in problem identification, generation (not only verification) of applied technology under farmer field conditions, and evaluation using farmers' criteria.*"[39] It takes place a change of emphasis of view putting people as central focus. The increase of agricultural production with new technology is not the main goal anymore, but the enhancement of human resources. The Farmer Field School's approach was developed using this new focus.

[38] Van de Fliert, E. /Asmunati, R. / Wiyanto / Widodo , Y. / Braun, A. (1996): 'From Basic approach to tailored curriculum – participatory development of a farmer field school model for sweet potato' – in: UPWARD (ed.) (1996): Into Action Research – Partnership in Asia Rootcrop Research, Los Baños, Philippines, p. 59

[39] cit. Van de Fliert et al. (1996), p. 60

Farmer Field School is an adult education approach that was mainly used to promote IPM, which has farmers as its focal point. Farmers should learn that experimentation and observation of their fields are their main tool for gathering useful information for their decision making. FFS are an intensive hands-on training program, which is "knowledge-intensive" and "location-specific".[40] This experience began with the *FAO's Intercountry Programme on Rice Integrated Pest Management in South, Southeast Asia* in the early 1980s. The FFS approach purposes not just to transfer technical knowledge about pest and disease control, but wants to familiarize farmers with four important principles:[41]

- grow a healthy crop;
- conservation of natural enemies;
- periodical observation of fields;
- training farmers to be IPM experts.

The FFS works in general with half-day sessions once a week. The sessions are carried out from a trained facilitator (not instructor), who follows a group of about 25 farmers over the full period of a cropping season. During the sessions period farmers do themselves experiment, observing, analyzing, registering and comparing the result of Integrated Pests and Diseases Management with conventional practice.[42]

2.5. Farmer Field School in Peru

The FFS in Peru began with a collaboration of CIP and CARE on potato pest and disease management. From 1994 to 1997 they collaborated to improve IPM of potato crop, especially important Andean potato pests like the *Premnotrypes spp*. and potato tuber moths like *Symmetrischema tangolias* and *Phthorimaea operculella*.[43] Between 1997 and 1998 CIP and CARE conducted a baseline survey in the northern province, Cajamarca,

[40] Van de Fliert et al. (1996), p. 61
[41] Braun, A. R. / Van de Fliert, E. (1997): 'The farmer field school approach to IPM and ICM in Indonesia – user participation' – in: UPWARD (ed.) (1997): Local R & D, Institutionalizing Innovations in Rootcrop Research and Development, Los Baños, Philippines, p. 64
[42] Nelson et al. (2001), p. 684
[43] Nelson et al. (2001), p. 688

analyzing farmers' perceptions, practices and the field-level damage. The results appointed potato crop as the most important crop in this region and late blight (*phytophtora infestans*) was considered a substantial problem for the majority of these producers.[44]

Although 67% from interviewed farmer considered late blight as their most important problem and 24% as second most important, just 9% was aware that late blight is caused by a pathogen. Moreover, changes in pathogen population increase severely the problem, making most fungicides ineffective. That means a lost from Peruvian potato crop to late blight of more than 15%.[45]

Considering this and the strong interest from the farmers in testing late blight resistant varieties CARE and CIP according to develop a pilot activity to adjust and evaluate the FFS as a strategy to provide the Andean population information, knowledge and technology. This should empower the people to elaborate their own solutions to agricultural problems.[46] The survey from 1997-98 provided the information to design the FFS in Peru based on a farmer participatory research approach (FPR), which was oriented to develop and evaluate technological options. Therefore, this approach of the FFS in Peru was designated FPR-FFS.

At the beginning of the program the sessions are conduced from an agricultural extension worker from CARE. He instructed the local facilitator to assume later the moderation of the sessions in his group. The training of a good facilitator seems to be a key of the sustainability of this approach. The FPR-FFS is working nowadays in twenty communities of the district of San Miguel in Cajamarca. Hence, the groups have between 1 and 4 years' experience of FPR-FFS. Contents of the curriculum of potato field guide are learning-by-discovering activities, field experiments, observations, evaluation activities, role-play, games, group dynamics and other participatory research activities.[47]

[44] Nelson et al. (2001), p. 688
[45] Nelson et al. (2001), p. 688
[46] Nelson et al. (2001), p. 689
[47] Nelson et al. (2001), p. 689

Figure 2: Experimental field of true potato seed from FFS of Vitian Bajo

The issues worked in the FPR-FFS are basically: seed management, preparation of the soil, sowing, use of fertilizer, pests and diseases, pesticides management, cultural operations, harvest, storage agro-ecosystem analysis and farm accounting. The curriculum has been developed, reorganized and modified over the time with the feedback of facilitators and farmers. Likewise, it has been adapted to the specific needs of each participating community.

The testing of new varieties is also an important part of the FPR-FFS. At the beginning farmers were testing a set of available genotypes with different levels of fungicide treatment during the first two seasons. During the third season they were performing experiments with potato varieties with different levels of resistance and fungicide strategies, experiments with new cloned breeding lines, experiments with true potato seed and finally experiments comparing IPM-strategy with their conventional strategies. Within the process experiments were becoming simpler trying to reach farmers more effectively.

2.6. The Region

This chapter presents some facts of the location of the research. It also describes some outline of the historical evolution of the agricultural sector in Peru and contributes to

understand necessarily of agricultural extension. Included are available references related to the department of Cajamarca and to the province of San Miguel.

2.6.1. Peru

Peru has 1.3 million km^2 divided in 11 regions, 24 departments and 148 provinces. From the 25.2 million people Peru's about 8 million live in Lima. The official unemployment index is of 8% but the tax of underemployment is nearby 44%. Nevertheless, the expected growth of the GNI is 3,6% in 2000.[48] Services sector contributed in 1999 with 55,3% to GDP. Industry's was 37,5% and agriculture's only 7,2%.[49] Low prices of agricultural products could be a reason for the modest value of agriculture's contribution to GDP. Likewise, that could explain the precarious situation of Peruvian rural population.

According to World Bank, 49% of Peruvian population live below the national poverty line. Around 40% of urban population live below the national poverty line while in rural area there is circa 64,7% people living in this same condition.[50] Peruvian government defines rural poverty as a monthly income of less than 43,3 USD and declines extreme rural poverty at 28,9 USD per capita and month[51]. Comparing this with other countries, it results that Peru's line of poverty is one of the lowest in South America, i.e. Brazil defines poverty at 75,5 USD per capita and month.[52] Between 51 and 65 % of Peruvian rural households fulfil premise of poverty. On the other side in terms of alphabetization Peru is one of the most developed countries in the Region. Only 6 % of men and 17 % of women are non-literate.[53]

In 1999 Peruvian farmers cultivated 271000 hectares of potato crop, means that nearly the sixth part of agricultural surface for potato production. Other important food and cash

[48] www.auswaertiges-amt.de/www/de/laenderinfos/laender/laender_ausgabe_html?land_id=134&type_id=12 accessed 02/08/01
[49] in "country data" from www.worldbank.org/data/ accessed 01/08/01
[50] www.worldbank.org/data/wdi2001/pdfs/tab2_6.pdf accessed 02/08/01
[51] FIDA – Fondo Internacional de desarollo agrícola (ed.) (2000): Hacia una regíon sin pobres rurales, p.29
[52] FIDA (2000), p. 29
[53] FIDA (2000), p. 28

crops are maize (460.000 hectares), rice (310.000 hectares), barley (142.000 hectares) and wheat (131.000 hectares).[54]

2.6.2. Department of Cajamarca and Province of San Miguel

The Department of Cajamarca is located in the Northwest of Peru and is bordered with Ecuador. It is surrounded of the Departments of Piura, Lambayeque, la Libertad and Amazonas and has a size of 33.318 km^2, what means about 2,6% of Peru's territory. Cajamarca is populated by 1.411.900 people, which are about 5,6% of the population of Peru.[55] Cajamarca includes the three geographical environments of Peru, the coast, the mountains and the tropical rain forest.

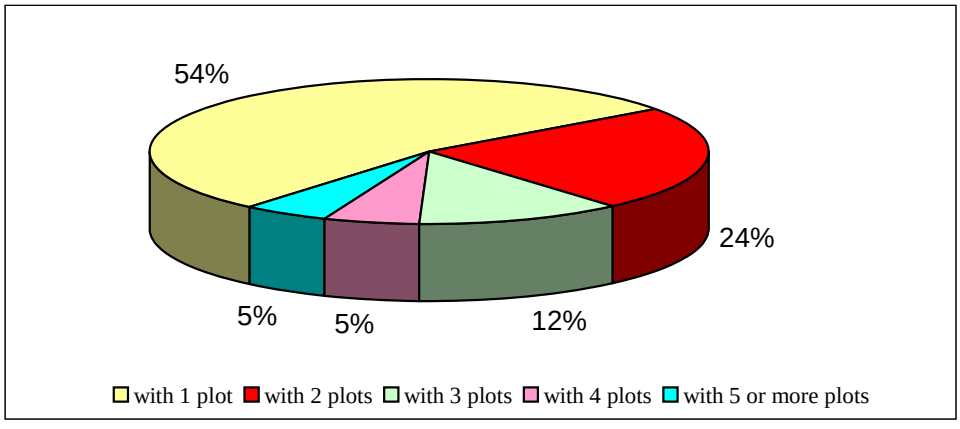
The entire agricultural area of the department is about 1.7 million hectares[56] or 4,8% of Peru's cultivated area.[57] Despite of the small territory of Cajamarca farmers harvested in 1999 nearly 24.000 hectares of potato, corresponding 8,8% of the national potato cultivation.[58] Density of potato crop is twice the average of the country. The Region is known for its dairy and sheep farming. It has the country's biggest amount of dairy cattle, about 76.700 animals.[59] Furthermore, one of the world's largest mines is located in Cajamarca. Since the Canadian enterprise Minera Yanacocha S.A. started to exploits gold in Cajamarca the production increases from 181 kg in 1992 to 47 tons of pure gold in 1998.[60]

[54] Webb, R. / Baca, G. F. (2000): Perú en números 2000, anuario estadístico, p. 735
[55] Webb / Baca (2000), p. 116
[56] INEI (1996a): Resultados definitivos III Censo Nacional Agropecuario – Departamento de Cajamarca, Vol. 1, Lima, p. 23
[57] INEI (1996b): III Censo Nacional Agropecuario – Perú perfil agropecuario, Vol. 26, Lima, p. 86
[58] Webb / Baca (2000), p. 747
[59] Webb / Baca (2000), p. 781
[60] Webb / Baca (2000), p. 818

Figure 3: General agricultural structure - Department of Cajamarca

San Miguel is a province of the Department of Cajamarca. The localization of the province is on the west of the department, as shows in figure 2, and has a territorial extension of about 1.350 km^2. There live 11.800 farmers. The major part of the population is living in the rural area. Nevertheless, about 68% of the people have primary education. The majority of the farmers own the land, but the most of the farms comprise just one plot, like showed in figure 1.

Figure 4: Plots per farmer in San Miguel

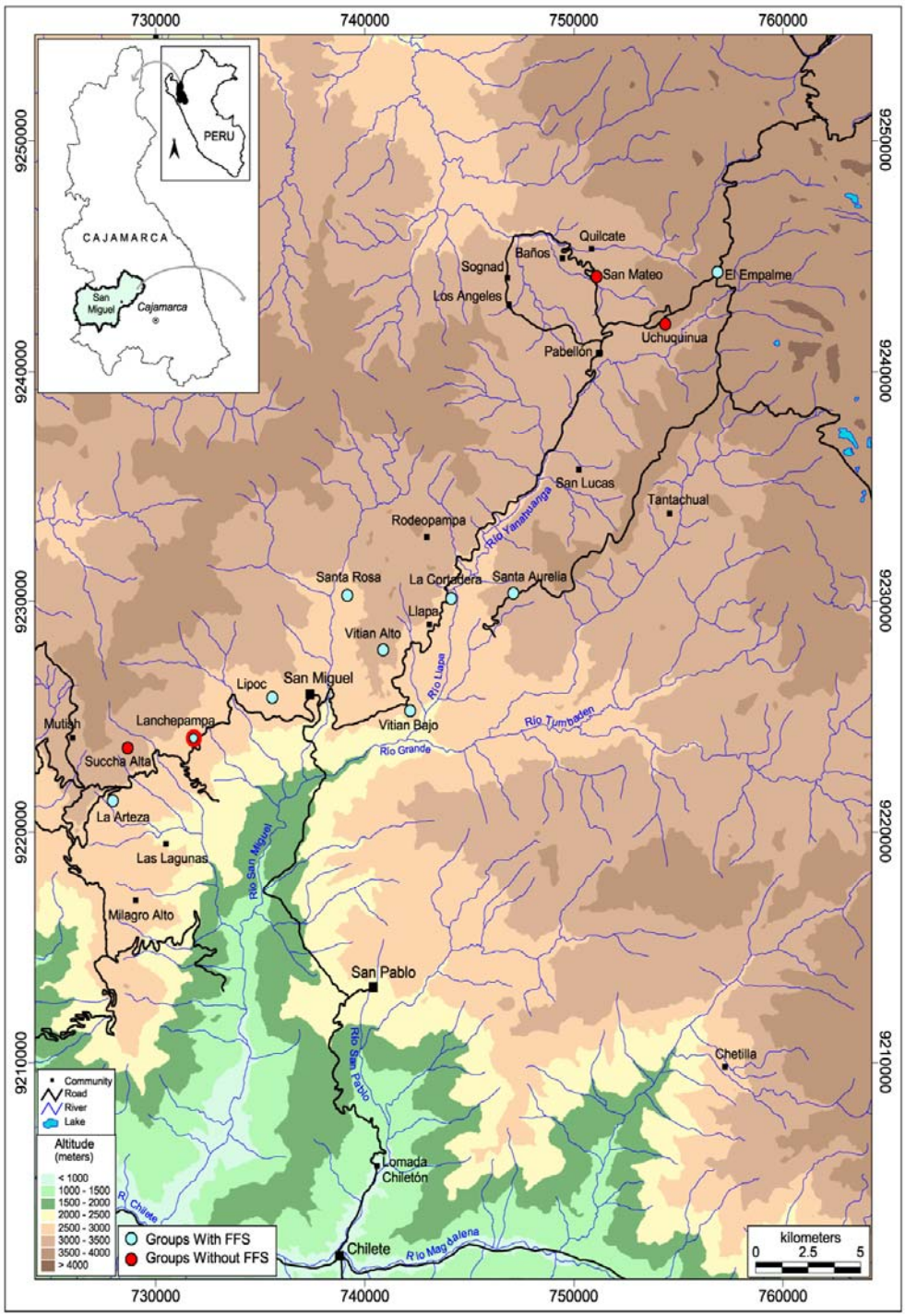


Source: INEI (1996a), p. 28

This suggests that most of the producers are peasants or subsistence farmers. They probably do consume a big part of their production and sell a small part in the local or

regional market. Main crops are maize and potato, which are cultivated between 2300 nn and 3800 nn.

Figure 5: Localization of San Miguel



Source: Centro Internacional de la Papa, 2001

2.7. Agricultural extension in Peru and Cajamarca[61]

In the pre-Columbian era Andean agriculture was based on the indigenous knowledge of ancient settlers in this region. The domestication of plants and animals in order to adapt them to the different climatic conditions in the area was a great achievement of the Andean civilization. This process began about 8600-8000 BC. When the Andean people began to be organized into the Inca Empire, they developed new technologies in order to the needs of a growing population. For example, they constructed terraces through which they increased the availability of land in the Andes and they knew about irrigation through a complex infrastructure. During this period the agricultural production was mainly based on potato, other tubers, maize, other native Andean cereals, vegetables and fruits. The Incas also produced livestock. In this time the Inca had two kind of sources of agricultural information. One was the informal component through interfamilial relationships, the other was a more formal component based on persons who applied the Inca political and economic objectives.

The colonial era runs from 1532, when the first Spaniards arrived in Peru, until 1821 when Peru achieved his independence. The Spanish conquers introduced new crops such as wheat, barley, sugar cane, alfalfa, vines, olives and other crops. New animals as chickens, pigs, goats, cattle and horses also invaded the country. During the colonial period Spanish landlords controlled the agricultural sector, particularly in the Peruvian highlands. It is not sure that Spaniards established an extension service to help settlers to improve agricultural production. Contrary occurred, Spanish settlers had to learn from Incas appropriate agricultural techniques in the first years of the conquest. Like in the pre-Columbian era, agricultural information and techniques disseminated through intra-family and inter-family exchange.

The republican era started in 1821, when political changes were implemented. However, haciendas remained as powerful production units. Landlords also extended their power to the politics. As a result of a growing demand for agricultural products in Europe and of a scientific influence on Peruvian agricultural system, export crops such as sugar cane and cotton were promoted during the second half of the century. Since 1879 the Peruvian

[61] Further in Ortiz (1997), pp. 5-38

economy and also the agricultural production was affected by the pacific war between the Chilean invaders and Peru. The harvests of the haciendas decreased and Peruvian farmers suffered under a stronger competition from imported products.

In the first decades of the twentieth century some important changes in Cajamarca's agriculture took place. Landlords tried to elevate the effectiveness of the agricultural production by the introduction of new races of livestock, new varieties of cereals and grass and new management techniques. Technological information spread to neighbored farmers. By this way dairy cattle production increased in Cajamarca.

1915 the Peruvian government created the Directorate for Water and Agriculture. Additionally they installed some agricultural stations, from which one was located in Cajamarca to introduce improved crop varieties and new livestock races. It was the first intervention of the Peruvian authorities to provide agricultural information and technologies to farmers.

1947 the multinational company of Nestle established a milk-processing factory in Cajamarca. This was the start of a productive relationship between Nestle and the landlords of Cajamarca. Nestle established also an extension service to provide information about dairy cattle management in the region. This was the first time that an agro-industrial company did capacitating to provide agricultural information in the Cajamarca.

Agrarian reform intended to solve the agricultural problems in Peru and was introduced by the military regime that governed the country from 1968 to 1979. The government wanted to change land properties, which was highly inequitable until the 1960s, when only 0,1 % of farms owned 59,3 % of total agricultural land[62]. After the agrarian reform 95,1 % of land was concentrated in collective farms[63]. Nevertheless, there were no possibilities for the new landowner to provide information and technology. During the late 1970s re-privatization began to be considered and finally in the 1980s when the

[62] Brodsky, J. / Oser, J. (1968): Land tenure in Peru: a CIDA study – in: American Journal of Economics, Vol.27, No.4, pp. 405-422

[63] Horton, D. (1977): Land reform and group farming in Peru, chap.9 – in: Dorner, P. (ed.): Cooperatives and comune, Wisconsin University Press, pp.213-238

military regime that implemented the agrarian reform left government, cooperatives were divided into small farms which had then private owners. After all changes in the history of Peru, private ownership of land became again the dominant land-tenure system of the country. Nevertheless the peasant remained unassisted by the government in terms of access to agricultural inputs.

3. Research Process

In this chapter are exposed the research problem, the objectives and the relevance of the study as well as a description of the methods of data collecting, selection of respondents and data processing. Further, the research constraints are discussed. Chapter 1 and 2, presenting theoretical framework and the background of the study, limits the context of the present chapter and are consequently necessary to its better understanding.

3.1. Research problem

Rural poverty is also a result of lack of information and consequently of knowledge. Supporting improvement of knowledge is a strategy to develop human capital, empowering people to work out solutions to their problems and to make better decisions. The problem to be investigated in this study is the perception of FFS-stakeholders of the impact of FFS-approach by the improvement of their knowledge. That problem can be stated with following research question:

Does FFS-approach offer an alternative to improve self-reliance and decision-making from small farmers in developing countries?

3.2. Research questions

- Do small potato farmers perceive an impact of FFS on their general aspects of living conditions?
- Do small potato farmers perceive an impact of FFS on their organization capacity?
- Do small potato farmers perceive an impact of FFS on their knowledge about agricultural skills?

- How does small potato farmers'' perception link with FFS-planners' and extension workers' perception about impact of FFS?

3.3. Study Objectives

The study objectives were defined to reduce the potential universe of data, which can be used to carry out the research. The general objective limits the argument of the study. The specific objectives aim the support of the process of data collection and analysis, helping to define methods of data collection, processing and analysis.

3.3.1. General

- to contribute to impact assessment of FFS in San Miguel through the consideration of farmers' perception.

3.3.2. Specific

- to describe farmer perceptions about the benefits of FFS
- to determine the changes in organization capacity of subsistence potato farmers, which were supported by FFS
- to identify the perception of subsistence potato farmers of San Miguel about the impact of FFS on their knowledge on technical skills
- to describe farmers' perception about FFS activities
- to determine the difference of the level of knowledge, organization, innovation, future related issues and sustainability of farmer groups who participate in FFS and farmer groups who do not
- to identify view of future of FFS-farmers concerning social and economic development

3.4. Relevance of the study

From the 6 billion people of the world 5.1 billion are living in the called developing countries.[64] About 23,4% of the population (about 1.2 billion people) of developing countries live with less than 1 USD per day. The World Bank defines this group as extreme poor people.[65] Taking into consideration the threshold for middle income economies, the share of people living with less than 2 USD per day and capita is 56,1%, what means about 2.8 billion people.[66] From 5.1 billion people living in developing countries, about 2.8 billion lived 2000 in rural areas.[67] Especially in Peru with a population of 25,2 million people lived 2000 about 6.98 of them in rural areas.[68] According *Webb/Baca* in the different regions from Peru – metropolitan region, littoral, mountains and jungle – are poor concentrated in rural areas.[69]

This situation is a big challenge for international development agencies and NGOs working in poverty alleviation and food security. One reason of this enduring poverty is lack of access to information and technical support to small farmers. Considering this, FFS approach can be a respond to this challenge. It offers an alternative way to agricultural information system especially in developing countries, where government is not able to assume this duty. This gives the subject of this study significance.

This study contributes to a larger impact assessment of FFS in Peru. Moreover, the study provides a case study of an experience of inter-institutional collaboration to rural development in developing countries, which uses improvement of knowledge as its main strategy.

Furthermore, the participatory tools used in this study can contribute to the development of appropriated qualitative monitoring methods of FFS, which can get the perception of stakeholders. That is important for the adjustment of FFS to the needs of its target group.

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[64] www.worldbank.org/data/wdi2001/pdfs/tab2_1.pdf and also www.worldbank.org/data/databytopic/POP.pdf accessed 31/07/01
[65] www.worldbank.org/poverty/data/trends/income.htm#table2 accessed 29/07/01
[66] www.worldbank.org/poverty/data/trends/income.htm#table2 accessed 29/07/01
[67] in “statistical databases” from www.fao.org/accessed 01/08/01
[68] in “statistical databases” from www.fao.org/accessed 01/08/01
[69] Webb/ Baca (2000), p. 551

The adjustment of a methodology to its target group, in that case FFS, provides effectiveness.

3.5. Selection of communities and survey respondents

The selection of communities and groups to participate in group discussions was made according to time of experience with the FFS from the groups. It were selected groups in communities with longest experience with FFS – 4 years – as well as groups in communities with shortest experience – 1 year. Control groups were also selected: some groups in communities with FFS-experience and other groups in communities without any FFS-experience. One group of CARE's extension workers and CIPs' planning staff involved with planning and implementation of the FFS in San Miguel was also taken into consideration. Control groups and CIP-CARE group were included to allow a triangulation of data, which should support the validity of the findings. CARE's extension workers assisted by the selection of groups, given that they work regularly with the farmers in San Miguel and know closely many groups. Extension workers perform also as mediator between farmers and me. The support of extension workers was a determining factor by getting farmers available for my work.

The groups selected for group discussions were divided in following major groups to facilitate processing and analysis of data:

- ⇒ 1 group with 4 years of FFS-experience
- ⇒ 2 groups with 3 years of FFS-experience
- ⇒ 4 groups with 2 years of FFS-experience
- ⇒ 2 groups' with 1 year of FFS-experience
- ⇒ 2 control groups in FFS-communities
- ⇒ 3 control groups in communities without FFS
- ⇒ 1 group of CIPs' planning staff and CAREs' extension workers

Selection of groups is displayed in table 2:

Table 2: Groups selected for group discussions

	Kind of group	**Community**	**FFS-participants**	**Participants of discussion**	**Date**
1	4 years of FFS experience	Lanchepampa	10 men/4 women	5 men/4 women	30/06/01
2	3 years of FFS experience	Santa Rosa	9 men	9 men/2 women	29/06/01
3	3 years of FFS experience	Santa Aurelia	10 men/11 women	4 men/11 women	06/07/01
4	2 years of FFS experience	La Arteza	8 men/3 women	8 men/3 women	27/06/01
5	2 years of FFS experience	Lipoc	14 men/2 women	11 men	28/06/01
6	2 years of FFS experience	La Cortadera	20 men/7 women	14 men/5 women	05/07/01
7	2 years of FFS experience	Vitian Bajo	11 men/4 women	6 men/1woman	12/07/01
8	1 years of FFS experience	El Empalme	11 men	9 men	03/07/01
9	1 years of FFS experience	Vitian Alto	9 men/7 women	6 men/5 women	12/07/01
10	Control group in community with FFS	Lanchepampa	-	4 men/2 women	10/07/01
11	Control group in community with FFS	Vitian Bajo	-	4 men	12/07/01
12	Control group in community **without** FFS	San Mateo	-	15 men/1 woman	07/07/01
13	Control group in community **without** FFS	Succha Alta	-	25 men/12 women	09/07/01
14	Control group in community **without** FFS	Uchuquinua	-	9 men/7 women	13/07/01
15	CIPs' FFS Planning staff / CAREs' Extension workers	Lima	-	5 men	20/07/01

3.6. Collecting Data in selected communities

The work in San Miguel was done from 20/06/01 to 16/07/01 with the logistical support from CARE Peru, which works together with CIP by the FFS. Between 27/06/01 and 13/07/01 occur all the group discussions in 13 communities. Some groups were just 30 minutes by car available, another one hour and the most far away were about 4 hours from San Miguel. The duration of the group discussions was about 2 hours in the groups with FFS and 1,5 hours in control groups. Consequently, it was very difficult to conduct more than one discussion in group per day. The groups with FFS had between 9 and 19 and the control groups varying between 6 and 37 participants. The questions were not the same for the FFS-groups and the ones without it. For the FFS-groups were the questions as follow:

- What did bring us the school?
- How many did change with the school?
- How is our work in group?
- How is our knowledge?

The question for the control groups were:

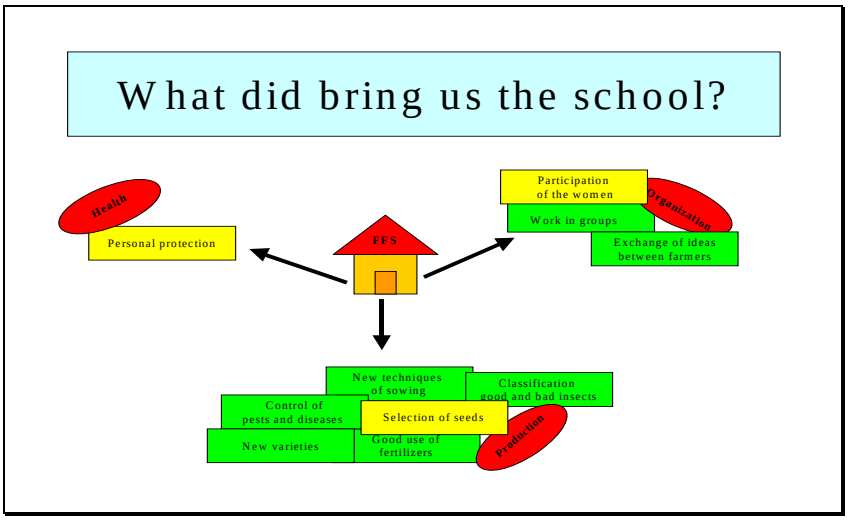
- How do we produce our potato?
- How is our knowledge?
- How do we want to learn about?

The extension workers from CARE arranged appointments with the different groups and one or two of the extension workers were always present during the discussion. They did normally an introduction, explaining what is the group discussion for. Than I could introduce myself and begin the work begin the first question.

3.6.1. Collecting in groups with FFS experience

The ideas concerning the first question - *What did bring us the school?* – were worked out in groups separate by gender when were possible. The group discussed about 15 minutes, writing its ideas on colored cards (different colors by men and women groups). The ideas should stand for the changes, which the FFS introduced and which the farmers perceived. The writing ideas from each group were all exposed, trying to visualize for the people their thinks. During the exposition take place a discussion of the ideas with the whole group, trying also to verify the information by the informants. The additional information, which came out during the whole group discussion, was registered. The visualization of the results was done like showed in figure 6.

Figure 6: Visualization of answers of a group to issue benefits



For the second question - *How many did change with the school?* – takes place a qualification of the ideas, which were worked out by the first question. For the qualification of the perceived changes were used three different faces symbolizing:

no change (☹) - *regular change* (😐) - *positive change* (☺)

Which participant received three faces and could vote how much did change with the school in his opinion. The numbers of votes were also exposed, so that people could visualize the results and comment them. The results were not separate by gender.

The third question - *How is our work in group?* - was also worked in the same groups of the first. The groups should discuss about how was its work in group at the past, how is it nowadays and how could it be better. The groups needed in general 15 minutes to work out their ideas and write them on the cards. After that the cards were exposed and took place a discussion about the results making possible to verify the information by the informants and get additional information.

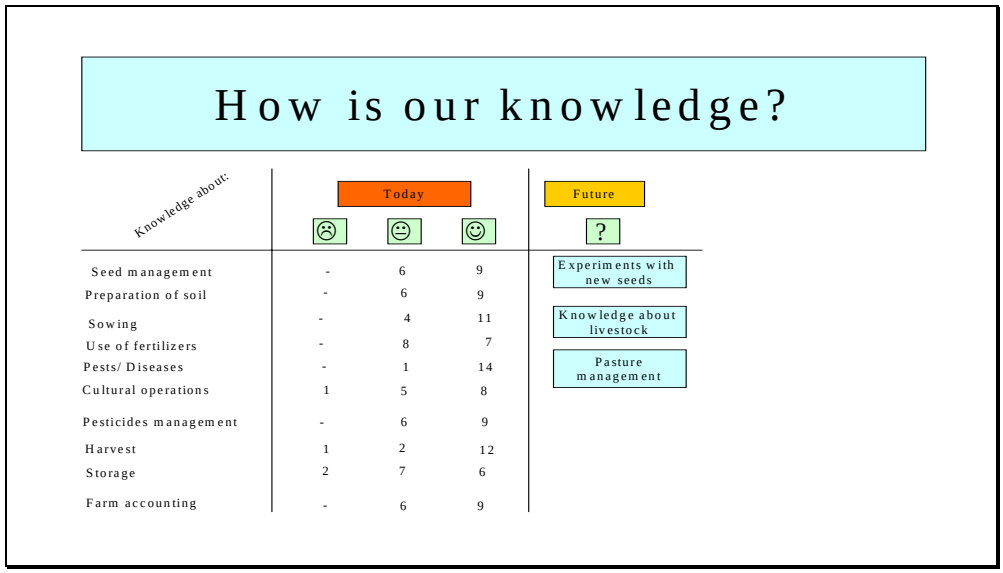
Figure 7: Collecting data by FFS-group of La Arteza

After the third question it took place a group dynamic, to avoid that people became too tired losing concentration. It consisted of recreation activities for groups, making people stand up, move and laugh. There were always activities about 5 or 10 minutes, but people got motivate again. An example of activity can be seen in the following picture.

Figure 8: Group dynamic with participants in group discussion

The last question - *How is our knowledge?* – was also voting with the three faces of the second question. In this question there were predefined aspects, which stand for the technical issues learn in the FFS: seed management, preparation of the soil, sowing, use of fertilizer, pests and diseases, pesticides management, cultural operations, harvest, storage and farm accounting. The voting should get the perception of farmers about what they did learn more and what they need to learn yet. In addition to the voting was asking about issues, that they find important to learn in the future. Like in the other questions, all information emerged during the whole group conversation was registered. The voting about knowledge was visualized like in figure 9.

Figure 9: Visualization of answers of a group to issue "knowledge"



3.6.2. Collecting in groups without FFS experience

For the control groups was used another question, but trying to emphasize the same aspects of the groups with FFS experience. It was also a more difficult to arrange the appointments with this groups. They were not so joined like the FFS-groups and therefor it was not so easy to coordinate their available time. Some of the people, who do not participate in the FFS, do not want to participate in a discussion, having different causes for it.

By the first question - *How do we produce our potato?* – the aim was to identify, if there is any difference between the way to produce potato from FFS-participants and the way to produce it from non-participants. Differences could stand for positive changes caused from the FFS. The question should be worked in groups, in which people discuss and write their ideas on cards. The results were exposed and were basis for a conversation with the group. The relevant information that came out from the conversation was registered.

The second question - *How is our knowledge?* – emphasized the same knowledge asked by the FFS-groups: seed management, preparation of the soil, sowing, use of fertilizer,

pests and diseases, pesticides management, cultural operations, harvest, storage and farm accounting. Like by FFS-groups takes place a voting with the three faces representing:

no change (☹) - *regular change* (😐) - *positive change* (☺)

The voting should allow a comparison between the standards of knowledge of FFS-groups and non-FFS-groups, which could indicates possible outcomes of the FFS.

Figure 10: Control Group in the community of San Mateo

Finally, the third question - *How do we want to learn about?* – tried to detect the issues that the group perceive as important for its development and if this issues were related with potato production. This information allows comparing, if the issues of FFS-groups and non-FFS-groups are similar or not.

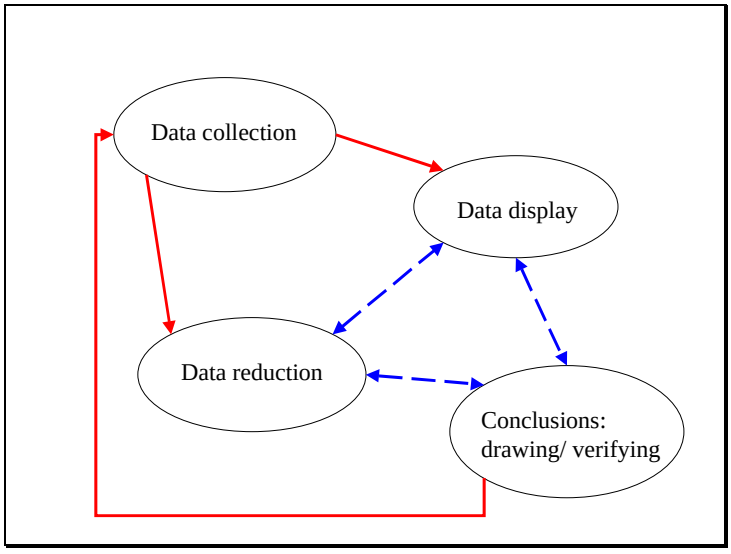
3.7. Data processing and analyzing techniques

Collected raw information is in general not immediately available for analyses and requires some processing. A transparent working scheme to data processing and analysis is necessary to avoid data miscoding, mislabeling and misleading. Data processing involves the operations needed for a systematic and coherent practice of data collection, storage and retrieval. These ensure accessibility of data, documentation of just what analyses have been carried out and also the saving of data and associated analyses. Data

analysis involves three different steps: the reduction of collected data, their display and the conclusion drawing.[70]

The process of data collection was already explained above in sections 3.4 and 3.5. The storage was done registering regularly data after each collection session, ensuring the availability of all data for later analysis and verification. Considering Grounded Theory as conceptual background of this study, data analyzing can be seen as an interactive process like *Huberman/ Miles* describe in graphic 2. That means, that these processes take place not only after data collection, but also during study design and during data collection as interim product, which will help to approach final conclusions.[71]

Figure 11: Components of Data Analysis: Interactive Model



Source: Huberman/ Miles (1994), p.429

In this study, analysis was carried out reducing the quantity of the registered data through coding, clustering and summarizing available information. This condensed data are organized and displayed chapter 4, permitting their interpretation. Interpreting is the process of drawing the meaning displayed data and could be made using a large range of procedures.[72] Here it will be used the comparison of perception of farmers from different

[70] Huberman, M. A./ Miles, M. B. (1994): 'Data Management and Analysis Methods' – in: Denzin, N. K./ Lincoln, Y. S. (ed.) (1994): Handbook of Qualitative Research, London, pp. 428-430
[71] Huberman/ Miles (1994), p. 429
[72] Huberman/ Miles (1994), p. 429

groups, the observation of patterns, the use of statistical tests, clustering groups with different perceptions, following up unexpected results and linking statements. These procedures will help to transformation of data in a conclusion, which will be presented in chapter 5.

The data collected in discussions in groups were divided in three main categories to be processed and analyzed:

- "Benefits" as general improvements of FFS stated by FFS-stakeholders;
- "Organization" as improvements of the FFS-stakeholders' capacity of organization stated by them;
- "Knowledge" as enhancement of farmers' understanding of agricultural technical skills related to potato production.

This division was made to facilitate the collection, processing and analysis of data concerning the impact of FFS, although these three aspects constitute a single reality. For each category was used an appropriated processing procedure, which will be described in the following sections.

3.7.1. Data processing of "Benefits"

Data collected through the first question was processed condensing perceptions with the same content in one key concept, like "management of pesticides" or "new varieties". It was accounted how many times one single concept did appear in each group. It was also distinguished between how many times a distinct perception was mentioned by men or by women. The available data about perceived benefits were arranged in some major groups clustering the single groups according their level of FFS-experience:

- group with 3-4 years FFS,
- group with 2 years FFS,
- group with 1 year,
- group of CIP-CARE.

The data displayed in this four groups works as basis for the analyses from farmers' perception about benefits of FFS. The perception of each group will be analyzed taking into consideration also the notes, which were taken during the discussion in groups. The analyses of the perception of these four major groups will support the final analysis and the drawing of a conclusion.

3.7.2. Data processing of "Organization"

The data collected about the category "Organization" was processed coding the perceptions of groups and clustering them according their content. This helps to build the key concepts by each group. The key concepts are "thick", that means they are full of meaning and should represent a sample of farmers' perceptions. The main perceptions from each group about the evolution of its work in group will be presented in a graphic.

Results will be presented separately per groups, trying to point out the regularities between groups with the same level of FFS-experience. The several groups from different communities and with different levels of FFS-experience were clustered in 6 major groups:

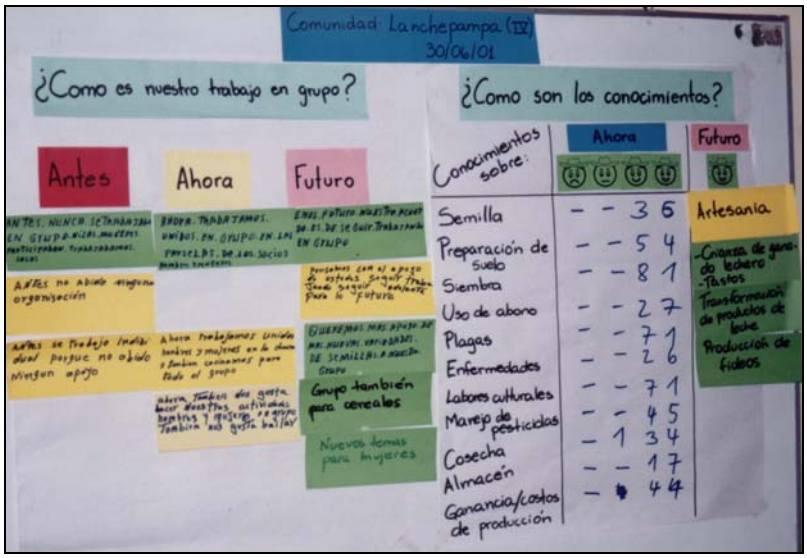
- group with 3-4 years FFS,
- group with 2 years FFS,
- group with 1 year FFS,
- control group in communities with FFS,
- control group in communities without FFS
- CIP-CARE group

The display of this data will allow the comparison of the perception of groups with different levels of FFS and find out the similarities and differences between them. These assumptions will serve as basis for final conclusions, which will take into consideration all three categories: benefits, organization and knowledge.

3.7.3. Data processing of “Knowledge”

The results concerning the category “Knowledge” will be processed using statistical tests. That seemed appropriated taking into consideration that data where collected mainly through voting. There are two main kinds of statistical tests, known as parametric and non-parametric tests. With parametric tests it is possible to calculate proportions of total variability in scores which are due, on the hand, to independent variables manipulated by the experimenter, and, on the other, to unknown variables affecting subjects’ performance.

Figure 12: Visualization of results from participatory group discussion



The major criterion for selecting an appropriate non-parametric test is based on whether there has been used the same subjects for all experimental conditions or different groups of subjects for each condition.

In our case, an unrelated non-parametric test, the Mann-Whitney test was applied. This test should be used for a two condition unrelated design when different subjects (knowledge of the groups) are used for each of the conditions (different level of FFS-experience). The test ranked the scores of all different subjects in both conditions as if they were a single set of scores. The null hypothesis was that there were no differences between both subjects in term of the conditions. It was rejected when significance level was lower than 0.05. If the differences between conditions are chance differences, as

defined by the null hypothesis, then there should be equal scores and, therefore, equal ranks in the two conditions.

In this study, chapter 3.6 described the fourth and last question of the evaluation, which was *"How is our knowledge?"* By voting farmers were asked to assess their knowledge of predefined aspects that were part of FFS schedule. They were able to use three different faces (☹ 😐 ☺) with three different values as votes. The face ☹ had value 1, the face 😐 had value 2, and the face ☺ obtained value 3. In each category of faces the number of votes was multiplied with the value of the face, and then divided through the number of votes. The result was a rank of farmers' perception about their knowledge like showed in table 3.

Table 3: Valuation of voting

Aspect	☹ = 1	😐 = 2	☺ = 3	Rank
Seed management	**2**	**9**	**3**	**(2*1+9*2+3*3)/14=2.01**
Soil preparation	**-**	**5**	**9**	**(5*2+9*3)/14=2.64**
Sowing	**4**	**7**	**3**	**(4*1+7*2+3*3)/14=1.93**

3.8. Research constraints

The time available to do the group discussions was just right to do it. Less then this would resulted in superficial information. With some groups it was difficult to arrange appointments, because they worked or had something else to do. Especially the groups without FFS experience were sometimes diffident or just did not come.

Although the language was not a problem for the research process, the cultural particularity of the region could be a cause of misunderstanding or mistakes. Therefore was it not possible to eliminate to possibility of misunderstanding.

Another aspect that requires mention is the subjective nature of the results. Qualitative research demands the interpretation of information, which is difficult to objectify in

numbers, because it talks about opinions, point of views, and perceptions of the stakeholders.

4. The impact of FFS in San Miguel – the farmers' perception

This chapter presents data, which are already summarized and subsequently used to draw conclusions. The presentation is done according to the three categories given in section 3.6: benefits, organization and knowledge.

4.1. Benefits

4.1.1. Groups with 3-4 years FFS

Like table 4 shows, the most frequently mentioned aspects were related to technical skills. Men pointed out IPM three times while women did twice. Farmers also perceived twice enhanced pest and disease control, a similar aspect to IPM, as benefit. This demonstrated the increasing level of farmers' knowledge in pest and disease control. During the discussions only one farmer said that after introduction of IPM pesticides application increased. In all other cases farmers' reduced frequency and amount of pesticides' application. With FFS, farmers dropped application of Aldrin and used other less toxic pesticides. Furthermore, they said that they progressed in terms of management of pesticides very much, but that they were still having a lack of knowledge in this aspect and wished more capacitating.

Table 4: Perceived benefits of focal groups with 3-4 years of FFS

Aspects	**Benefits perceived**
Technical	IPM (5)
	Management of pesticides (4)
	New varieties (4)
	Management of potato crop (3)
	Enhanced pest and disease control (2)
	Field and tuber evaluation (2)
	Systems of land use (1)

	Harvest yield (1)
	Other crops (1)
Social	Participation of women (3)
	Exchange between farmers (2)
	Work in group (1)
	Distraction (1)
	Plan of activities (1)
Health	Enhanced health (3)
Economy	Enhanced economic situation (1)

While management of pesticides was mentioned only by men, both men and women cited the introduction of new varieties as benefit of FFS. This showed that farmers had lacks of knowledge on these two issues. Their deficit of information in management of pesticides was large, too. The cultivation of a few varieties of potatoes, which were often susceptible to common pests and diseases, meant that farmers applied more pesticides to protect their crops. Farmers believed that the results of inappropriate application of pesticides were loss of harvest, high costs of production and a contaminated environment. During the discussion, farmers argued that introduction of new varieties changed positively their potato yields.

Farmers mentioned a number of social aspects. Participation of women was the most important social aspect. It was brought up three times. About the intensity of the change of participation of women, farmers voted that this aspect changed very much with FFS. Interestingly men perceived this change in participation of women then women did.

The second important social transformation was exchange of information between farmers. Men only mentioned it, this could signify that in the past women were not involved in agricultural labors and did not participate in meetings.

Surprisingly, only women named health and economic aspects as benefits of FFS. Men did not perceive changes in these two aspects. Farmers' health was enhanced through improved self-protection applying pesticides. A female participant said that after the

second year of visiting FFS she noticed an improved economic situation because of increased harvest yields.

4.1.2. Groups with 2 years FFS

Integrated pest and disease management (IPM) was the most often named benefit brought through FFS. Men said it 8 times and women three times. Like the groups with 4 and 3 years of FFS experience, focal groups with 2 years of FFS experience perceived IPM as the most important benefit. Nevertheless, farmers said that they required more capacitating in this aspect than in any other aspect of potato production.

Table 5: Perceived benefits of focal groups with 2 years of FFS

Aspects	**Benefits perceived**
Technical	IPM (11)
	Seed management (7)
	Management of potato crop (3)
	New varieties (2)
	Use of fertilizer (2)
	Harvest yield (2)
	Sowing (2)
	Cultural labors
	Agro-ecological analysis
	Field evaluation
	Management of pesticides
	Other crops
Social	Work in group (3)
	Participation of women
	Exchange between farmers
Health	Self protection using pesticides (2)
Disadvantage	Change of fungicides

Seed management got seven nominations, from which two were from women. This involved a number of labor related activities. These were dressing seeds after harvest,

appropriate storage, germination and if it was necessary purchase of suitable varieties. The whole process of potato production, from providing seeds and other inputs until harvest and post-harvesting was mentioned three times. As in table 5, farmers perceived 12 different technical aspects as benefits of FFS.

Only men mentioned social aspects. Most observed social benefit was work in group, which was named three times. The other social changes through FFS were participation of women and enhanced exchange between farmers. Other non-technical changes were self-protection using pesticides and one disadvantage. One farmer said that in FFS they learned that Aldrin is toxic and generates cancer. That was why they did not use it anymore. Finally some farmers murmured that they got a bad recommendation from one facilitator. They changed type of fungicide applying in their potato fields and lost most of their crops affected by *Phytophtora infestans*.

4.1.3. Groups with 1 year FFS

Over 80% of farmers' responds were related to technical innovations of potato production. Seed management and new varieties were the most often apprehended benefits of FFS, each was named three times. Nominations of these aspects were interrelated with study schedule of FFS. The first year farmers started capacitating in labors of the beginning of potato campaign. Therefore farmers' strongest perceptions of benefits were seed management and introduction of new potato varieties. While only men mentioned seed management, twice women mentioned introduction of new potato varieties as FFS gain. As in preview groups, farmers also pointed out IPM and management of potato crop as important changes. This group was the only one, which named decision making as benefit. They remarked in the discussion that increasing knowledge, aggregation and improved exchange of information gave them capability to take the right decision in terms of potato production.

Table 6: Perceived benefits of focal groups with 1 year of FFS

Aspects	Benefits perceived
Technical	Seed management (3)
	New varieties (1m, 2w)
	IPM (2)
	Management of potato crop (2)
	Agro-ecological analysis
	Decision making
	Soil protection
	Use of fertilizer
	Management of pesticides
Social	Participation of women (1w)
	Work in group
	Exchange between farmers

4.1.4. CIP-CARE group

CARE's extension workers and CIP's FFS planning staff specified several different kinds of benefits. These were technical aspects, social aspects, aspects of health, economic aspects, changes in behavior and mentality of farmers and effects of FFS that had an influence on CARE and CIP. In contrast to number of benefits nominated by farmers, extension workers and planning staff thought that there were more changes in farmers' life than they did. Different points of views generated different answers. The response of extension workers and planning staff coincided with the objectives of FFS.

Table 7: Perceived benefits of CARE's extension workers and CIP's FFS-planners

Aspects	Benefits perceived
Technical	Management of potato crop (3)
	New varieties (2)
	Agricultural knowledge (2)

	Appraisal and rescue of local knowledge (2)
	Opportunity to learn and apply something different to the traditional
	Decrease of application of pesticides
	IPM
Social	Work in group (2)
	Self-consciousness of farmers (2)
	Encourage other farmers
	Participatory activities
	Inclusion of women and men of all ages
	Exchange between farmers
Health	Increase contribution of potato to farmers' nutrition
Economy	Increase production of potato as cash crop
	Contribution to improve life conditions
Behavior and mentality	Change of farmers' view of problems (2)
	Expectations of how to solve other problems (cattle, beans)
Disadvantage	More work, less time for their activities
	Increased demand of facilitator
	Non-participation of many farmers in FFS communities
Effects for CARE and CIP	Knowledge of participate investigation and capacitating for CARE and CIP

Most important technical benefit that brought FFS was management of potato crop with 3 nominations. Extension workers and planning staff said that potato production improved in general, and not only one specific part. Similar was also the situation in terms of the increasing agricultural knowledge of FFS farmers. This meant that farmers additionally were able to learn something on other aspects of agricultural production. Extension workers and planning staff also observed that introduction of new varieties and appraisal and rescue of local knowledge were two main technical benefits. Number of technical

aspects in relation to the other aspects was small. Contrary to farmers' opinion, extension workers and planning staff named only once IPM respectively a similar aspect as profit.

Extension workers and planning staff mentioned six different achievements in farmers' social life, work in group and self-consciousness of farmers. Both observations were noted twice. The other pointed-out aspects were similar to farmers' perception in this point.

In terms of health, the team meant that through FFS increased contribution of potato to farmers' nutrition. Similar were the economic changes. Extension workers and planning staff stated also that farmers' production of potato as cash crop increased and both pointed finally improved common life conditions.

But they also perceived changes in farmers' behavior and mentality. FFS gave them capability to get another view of problems, and capability to solve more problems on their own, instead of waiting for an external aid. In our case extension workers and planning staff expected that they were able to make first steps to work on their problem in dairy cattle and bean production.

However extension workers and planning staff saw three disadvantages of FFS for participants. First was that obligation of lesson assistance signified that farmers had less time for their activities and more work to do. Increased demand of facilitator had for local facilitators the same consequences as FFS for other participants. Technicians and planners recognized non-participation of many farmers in FFS communities as a problem. In a debate, they said that in future they wanted to give a larger number of farmers the possibility to take part in FFS.

Finally, there existed also a benefit for CARE's extension workers and CIP's planning staff. They perceived enhanced knowledge of participate investigation and capacitating as a plus for their organizations. In future, there will be other projects in which they would be able to apply their increasing experience in this type of work.

4.1.5. Comparison of perceptions about benefits

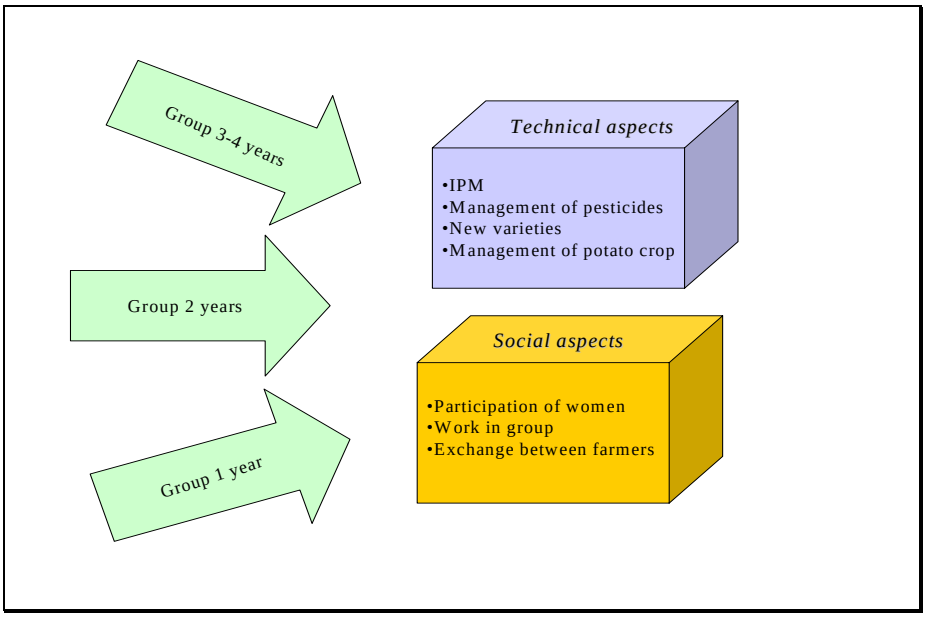
Watching and analyzing the answers of the interviewed farmers, extension workers and planning staff, it is possible to conclude about the impact of FFS.

The most remarkable thing is that technician and planners perceived a large number of different benefits compared with farmers' perceptions. Most of their aspects, 15 out of 22, were related to non-technical achievements. They also recognized two disadvantages of FFS. Extension workers and planning staff also saw an effect for themselves. Knowledge of participatory investigation and capacitating could help organization such as CARE and CIP to contribute to rural development in developing countries.

In perceived benefits emerged among the groups a number of differences. Farmers with less experience in FFS noticed major technical changes in comparison with others. The longer farmers were in FFS the more they perceived modifications of their social life, health and economy as benefits. Farmers realized first changes that brought them higher harvests and yield or rather less costs of production. So they first applied things that let them earn more money from their work, and disregarded knowledge with no economic consequences. Women perceived more non-technical changes than men, probably because of perceived non-participation of women in agricultural labors. Women first recognized benefits that changed their personal life conditions, and these were often non-technical aspects.

Nevertheless, all groups believed that FFS brought them some of the same benefits. Independent from education level they mentioned that FFS brought them technical and social benefits as figure 13 presents.

Figure 13: Benefits perceived by all FFS-groups



4.2. Organization

4.2.1. Groups with 3-4 years FFS

Average, groups perceived that their organization as a group was improved since they participate in the FFS. They characterized their work before the FFS as “individual”, “not organized” and “without participation of the women”. Some farmers see this as a lack of mutual confidence. Other farmers see this as habitual.

In contrast to the past, individuals perceived the improvement of work in group and felt that this was a positive change. They perceived the work in group as more feasible and quicker and some of them mentioned that the group is ground also for other activities like entertainment. In general women’s participation in decisions and work concerning agricultural production was increased since FFS started. Farmers of Santa Aurelia (most of them women) mentioned that they help each other to carry out the work on their fields.

Asked about the future of working in group farmers expressed the willing to continue working in groups and included the necessity to intensify it. The FFS-group of Santa Aurelia considered the organization of more FFSs as a target for the future.

4.2.2. Groups with 2 years FFS

Also in groups with 2 years FFS did people perceive their way to work before the FFS started as “individual”. Three of the four surveyed groups mentioned the lack of knowledge in technical skills as characteristic for their way to work in the past.

As characteristic for the present farmers brought up work in group and as its consequences “exchange between farmers”, “access to technical consulting”, “knowledge of new technologies” and “experimentation”. Moreover, the group of La Arteza pointed out also the social aspect of working in group: “more friendship” and “entertainment”.

Discussing about the future of their work in group, farmer there were unanimous about the essentiality of continue working in group. Farmers perceived the group as potential basis for further improvement of their own conditions. Three of the four surveyed groups mentioned the group as a channel to increase the possibilities of commercialization of their products. The FFS-farmers of Lipoc and La Cortadera pointed out the group also as a channel to access credit. Farmers of Lipoc discussed also the possibility of micro enterprises starting from groups like the FFS-group.

4.2.3. Groups with 1 year FFS

These groups characterized their work before beginning the FFS as “individual”. Women did not work and make decisions together with men about agricultural skills. The change from individual to group work occur in these communities with the beginning of FFS. Exchange between farmers was also increased. However, farmers perceived that individual work is even now stronger than work in group. Farmers of El Empalme pointed out the necessity of more awareness about the importance of work in group to solve problem like the search of market and the purchase of agricultural inputs.

4.2.4. Control groups in communities with FFS

In the two surveyed groups in communities with FFS, farmers did not participate in any group. They worked individually and depended mostly from day laborer to execute their work on the field.

4.2.5. Control groups in communities without FFS

In the three surveyed groups in communities without FFS, there existed groups working together. These groups were in general organized around a important person in the community: a teacher, like in Succha Alta and San Mateo, or a leading member of a extended family, like in Uchuquinua.

4.2.6. CIP-CARE group

CARE's extension workers and CIP's developers of FFS perceive that farmers did work individually before they began to participate in the school. Although they worked sometimes in group by communal tasks, they were mostly disorganised. There was just little exchange between them. The existing training was focused on individual and not on the group work.

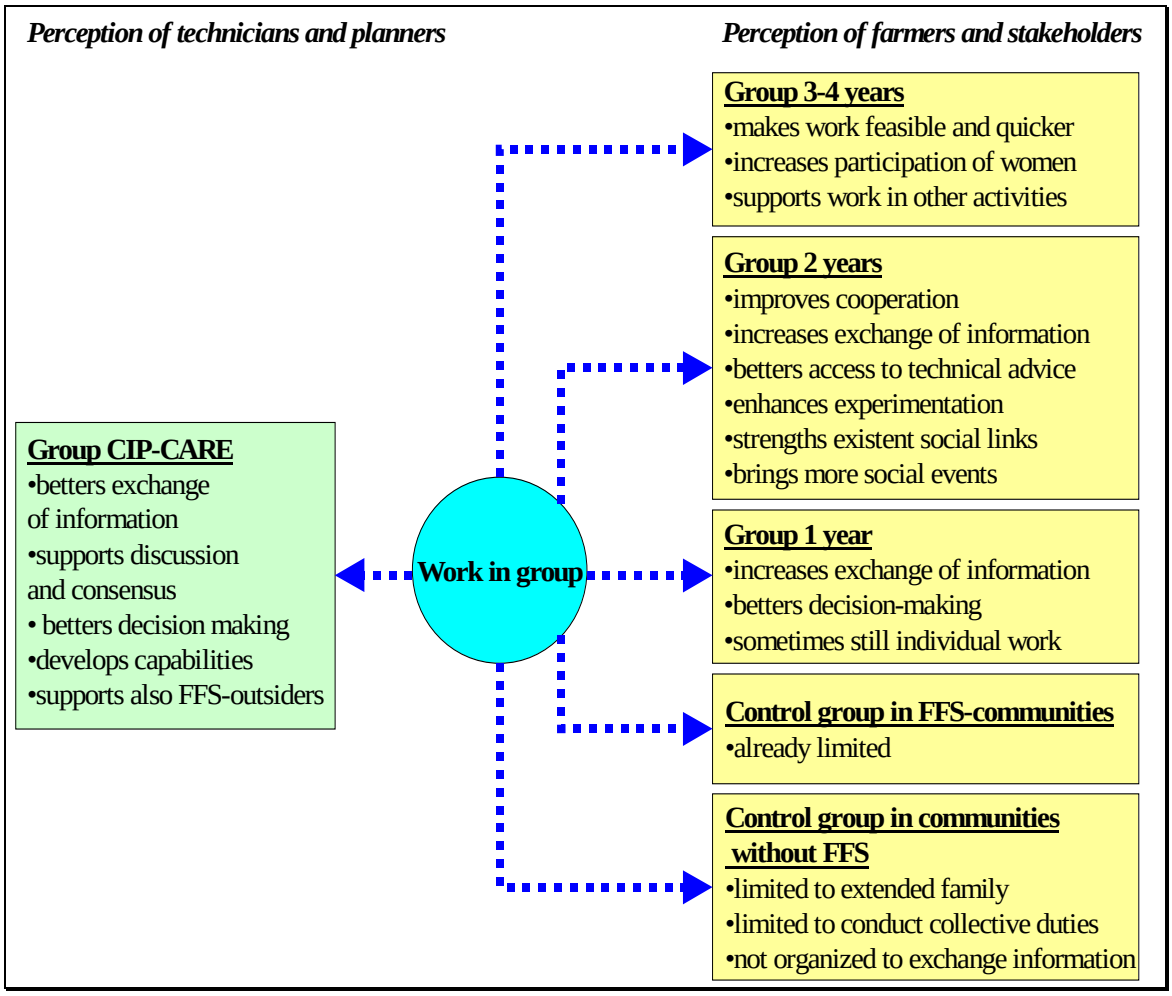
Observing the present situation the CIP-CARE group perceived that work together is a reality in the FFS-groups. Exchange between farmers increased with FFS. Farmers interact, discuss, analyse and work out decisions in the FFS-group. The CIP-CARE group perceived also that farmers develop new capabilities in a group, like the capability to be a facilitator. A parallel result is that some FFS farmers supply non-participating farmers support and information.

For the future, they mentioned the work of facilitators as basis for sustainability of FFS's work. They considered desirable, that the FFS-farmers undertake contact with other organisations to develop other subjects. Furthermore, farmers should use the same group for other activities, trying to be self-reliant.

4.2.7. Comparison of perceptions about Organization

Perceptions of different groups of changes in their organizational conditions are summarized figure 14.

Figure 14: Farmers' perception of organization in the present



Summarizing, all FFS-groups as well as the CIP-CARE group perceived a positive change in their organizational conditions comparing with before beginning the school. The group work was improved through the FFS bringing many advantages for stakeholders. These advantages concern especially potato production, but positive effects also extend to other aspects like strengthening social links.

A very important point is the transformation of FFS-groups in information source for their participants, and also for non-participants within a community. Farmers have in general some information sources: family, extended family, extension service, market,

pesticide sellers, radio, temporary migrants and neighbours.[73] FFS-group affords the opportunity of farmers to get technical information about potato production.

4.3. Knowledge

Mann-Whitney-Test (explained in section 3.7.3) was used to rank the scores of two different groups with two different levels of FFS-experience, as if they were a single set of scores. The test was processed with SPSS for windows 10.1, using data collected by voting during group discussions. Table 8 summarizes results of the test between different groups.

At the beginning average rank of communities with 3-4 years of FFS experience were tested with entire averages of other groups. Comparison with groups with 2 years of FFS experience resulted that there existed a significant difference in terms of their perceived knowledge. After pursuing the comparison of 3-4 years with the others it showed that they had significant differences with all kinds of groups. This confirms the assumption that the longer farmers visit FFS the more increases their knowledge related to potato production. But Mann Whitney U presented that difference between 3-4 years and 1 year was less significant than difference between others. Obviously farmers with 1 year of FFS-experience overestimated their technical knowledge. Farmers' level of knowledge was elevated so much in the first year that they had a biased impression of it.

Table 8: Mann-Whitney Rank Test - knowledge of groups of different levels of FFS

Tested groups (Average of the groups)	**Mann-Whitney U**	**Asymp. Significance** (2-tailed)
4-3 years **with** 2 years	16.50	0.011
4-3 years **with** 1 year	24.00	0.049
4-3 years **with** control groups in FFS-communities	21.00	0.028

[73] Vasquez-Caicedo, G./ Portocarrero, J./ Ortiz, O./ Fonseca, C. (2000): Case studies on farmers' perceptions about Farmer Field School (FFS) implementation in San Miguel, Peru – Contributing to establish the baseline for impact evaluation of FFS, Lima, p. 47

4-3 years **with** control groups in communities without FFS	0.000	0.000
2 years **with** 1 year	31.00	0.150
2 years **with** control groups in FFS-communities	8.000	0.001
2 years **with** control groups in communities without FFS	0.000	0.000
1 year **with** control groups in FFS-communities	11.50	0.004
1 year **with** control groups in communities without FFS	0.000	0.000
control groups in FFS-communities **with** control groups in communities without FFS	19.00	0.018

That also was reason of the result of the test between 2 and 1 year of FFS experience. These groups had no significant differences in terms of their perceived knowledge. Ranks of the 1-year and the 2-year group were similar. Between 2 years and groups without FFS experience, in FFS communities and in communities without FFS, existed a significant difference in farmers' perceptions. In the second case, Mann-Whitney test presented the biggest difference as possible.

The 1-year group had significant differences with both, control groups in communities with FFS and control groups without FFS. As expected, introduction of FFS changed farmers' perception of their knowledge. Ranks of farmers' knowledge of the 1-year groups were much higher than ranks of the two types of control groups. This showed that introduction of FFS allowed farmers improve their technical skills.

The Mann-Whitney test compared control groups of FFS-communities and of communities without FFS. The estimates demonstrated a significant difference between the control groups. Reasonable is that in communities with FFS, there took place a dissemination of information and improvement of technical knowledge. Control groups were able to absorb information from their neighbors or familiars who participated in

FFS. In all comparisons between the two kinds of control groups and the others, the Mann-Whitney U of groups in FFS-communities was higher than that of control groups without FFS. The estimated significant difference between control groups with FFS and others was smaller than that of the one of control groups without FFS.

5. Conclusion

This study has been developed to question if rural development can be supported or initiated by an appropriate method of agricultural extension. Prior used top-down approaches, with donation of technological packages, which often depended on for peasants' inaccessible tools, inclusion of use of pesticide as imperative and an unsatisfied knowledge level of beneficiaries, were in longer terms not sustainable. The FFS is a response to work with knowledge intensive technologies in addition to participation of target groups in problem identification, generation of applied technologies and evaluation. Main goal of the new type of agricultural extension is improvement of human resources by participatory capacitating. This study wanted to see if FFS is an appropriate approach of agricultural extension, which contributes to rural development, also wants to evaluate impact of FFS in the communities. Impacts of FFS are divided in three sections, benefits, organization and knowledge, and are presented in this section.

What type of benefits do farmers perceive that FFS generated for them? Assessment of impact of FFS presents some findings. As in figure 5 presented, all groups of evaluated FFS participants observed a number of coincided benefits. In all cases farmers said that FFS learned them about IPM, a methodology that is build on intensive knowledge. Similar to IPM was the benefit of improved management of pesticides. This aspect did include frequency and doses of applications, purchase of pesticides, self-protection and safe disposal of empty canisters of pesticides. Farmers noticed introduction of new varieties as one main benefit of FFS. Diversity of cultivated varieties of potatoes emerged a lot. FFS brought not only introduction of new breeding-lines of CIP also provided indigenous varieties of other production areas of Peru. Management of potato crop in general increased and was systematized by FFS. Farmers received in all kinds of labors

related to potato production capacitating and noticed improvement of their knowledge in these aspects.

Perceived social changes were in comparison with number of mentioned technical aspects small. All groups observed a change in participation of women, both men and women mentioned it. Through FFS women were involved in fieldwork, especially in potato production, and even in decision-making. Consequently self-confidence and self-consciousness of women increased. The most pregnant modification in social terms was beginning work in group. Before starting FFS some farmers did co-operate for different activities, i.e. installation of drinkable water, irrigation management, but finished co-operation when objectives were aimed. Farmers understood that one of the keys of a long-dated improvement of their agricultural production is the unification of their interests and necessities.

Farmers perceived preponderance of non-tangible benefits from FFS. Obviously, an investment as capacitating provided a number of capabilities. These were different types of capabilities according to potato production, and also others like writing, reading, disciplinary, concentration, and capacity of interpretation of written and drawn material. So FFS broke barrier between farmers and some information sources. Few farmers mentioned that they learned to transfer information and knowledge; they used them to solve other kinds of problems. Whether potato crop was not main income source[74], farmers perceived profit from FFS.

Do small potato farmer perceive an impact of FFS on their organizational capacity? Organizational changes took place in all kinds of FFS groups. Certain communities had preview existing groups. These groups did just work to goal communal duties, like above explained. But there were no pre-existing groups, which aimed exchange of information or technical skills, increase of human capital. Human capital comprises health, education and labor[75]. Farmers were supported in these aspects by FFS. The longer farmers visited FFS, the more they were used to work in group also for other kinds of activities. Farmers

[74] Vazquez et al.(2000), p. 80
[75] Narayan, D. / Patel, R. / Schafft, K. / Rademacher, A. / Koch-Schulte, S. (2000): Voices of the Poor – Can Anyone Hear Us? , The World Bank (ed.), Oxford a.o., p.53

achieved with work in group different things, self- consciousness and self-confidence increased. A main role in the group took over local FFS facilitator, who contributed to success of FFS and often reached for alternative activities. Taking gender aspect into consideration, another social transformation was that FFS supported participation of women. As well women as men profited from FFS group as information source. But group also enrolled exchange of information and decision-making after group discussion. In the context of organization FFS brought also a disadvantage. While FFS participants generated a close group, non-participants of the same community were excluded of all activities. That causes on the fact that FFS groups based often on pre-existing groups or extended family groups. Other reasons of the exclusion of some community members were internal problems of the community, like envy or conflict between neighbors.

Do small potato farmers perceive an impact of FFS on their knowledge and skills about potato production? Farmers demand complex types of information and knowledge related to activities of potato production. As in chapter 2.3 described, farmers need to ensure the application of information three types of information. These are basic information, applicable information and complementary information. FFS gives farmers possibility to get basic and applicable information about potato crop. Combining these types of information and pre-existing knowledge should generate a new knowledge. Result is that new knowledge let increase human resource. This kind of investment is difficult, but has a value in longer terms. On contrary are the realized types of development aid of the past. All kinds of organizations working in this sector used to implement a complete technological package. In short terms it was a big material donation for the beneficiaries, but it often lost its value the day organization left location. Without a significant level of knowledge farmers were not able to use technological donation in the right way, and they lost their value and were transient. So it is remarkable that technological transfer in form of machines or other material things without an appropriate facilitation of the beneficiaries did not contribute that much as wanted to rural development. Investments in education of rural population need more time and seem to be more difficult, but success is more probable and finally benefit is sustainable.

The creation of new knowledge depended in all kinds of groups on the same topics. Entering FFS, farmers started with divergent pre-existing knowledge. It was composed of indigenous and acquired knowledge through other organizations and information sources. The location of community, the distance and kind of transport track influenced it. The better infrastructure and the nearer next town was, the more sources of information the farmers had and the more elevated pre-existing knowledge was.

But there also existed a number of reasons why farmers did differ in perception of their knowledge. Perceived knowledge level can be grounded on the effect of groups which had small pre-existing knowledge had impression of big advance in terms of their knowledge after first year visiting FFS.

Findings also contain links between farmers perception and perception of technicians and planners. Technicians and planners gave weight to different benefits as the farmers did. Farmers valued more technical aspects and technicians and planners valued more social or similar aspects.

Another objective of the study was to assess the impact of FFS on capability of small farmers to solve their problems and on rural development in developing countries. FFS offers agricultural technical information, which farmer can transform in knowledge. Knowledge supports self-confidence and a better decision-making and this is the ground of a better capability to solve problems.

Main issue is improvement of human resources and that is what farmers perceived (see WB-Definition of Human Resources, Which aspects of this definition did FFS improve?)

1. Perception definieren am Anfang “key concepts”!

2. Frage nicht so offen halten!

3. Resultate auf die Informationspyramide beziehen und eventuell auch auf die Maslow‘sche Beduerfnisspyramide.

4. Fragen und Problemen erwaehnen, die die Arbeit nicht loesen konnte als Empfehlungen fuer kuenftige Evaluationen.

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