

Comparative evaluation of participatory and conventional approaches to impact assessment- A SWOT analysis.

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(Draft)

Abstract

An evaluation of cotton-based conventional and IPM farming systems in terms of the ecological, agronomic and social sustainability was conducted in India (2002-2004). The evaluation covered a number of different fields, from the ecological footprint of cotton production, the health impacts of the use of insecticides on spray operators and farm workers to the social impacts in terms of overall livelihood and empowerment. To tackle the data requirement generated by the multidisciplinary research, a mix of methodological approaches with different degrees of farmers' participation was used. The environmental impact was calculated by means of a Life Cycle Analysis, which quantified polluting emissions of cotton production. Information on practices and input use were collected interviewing farmers. The self-health monitoring of acute poisoning was conducted using a partially participatory research tool that placed farmers as the main respondents. Finally, a Sustainable Livelihood Analysis was conducted to capture farmer's emic perception of impact using a fully participatory approach. The two latest studies were designed to include the evaluation of gender differences. This paper proposes a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of the methodologies used in the impact assessment. The role of participatory research in impact assessment and its synergy with conventional research is discussed. Furthermore, the importance of a gender sensitive approach to ensure effective project implementation and evaluation are analysed on the basis of the experience gained in the impact evaluation of cotton IPM FFS.

Introduction

Agricultural intensification in South India has reduced the economic capacity and sustainability of poor farmers' livelihood. The abuse of chemicals has undermined human health (Kishi et al., 1995; Mancini et al. 2005a) and polluted natural resources. To reverse these negative trends, the Indian government is promoting farmer-centered Integrated Pest Management (IPM) education as an alternative to technology-transfer extension. Farmer Field Schools (FFS) in IPM were organised by the Food and Agriculture Organisation (FAO) of the United Nation in collaboration with the Government of India since 2000, primarily in cotton-growing states to reduce the use of chemical inputs in farming. FFS are an example of Participatory Research and Extension that engages researchers, extensionists and farmers in on-site experimentation (Percy, 2005). Research topics are identified by farmers on the basis of local problem analyses and trials are laid out with the technical assistance of trained facilitators (e.g. extensionists, university researchers, NGO staff) (Kenmore, 1996; van den Berg, 2004). Critical thinking and dialogue among participants to find new solutions are central elements to the experimental learning process. FFS emphasis on farmer's project ownership, partnership and collaboration opens the

door to local-specific project developments based on farmers' needs and interest. A common example is the formation of farmers' associations and groups with diversified social and technical agendas. Farmers' self-development, improved skills, strengthened social ties, improved connections with local institutions – in one word farmers' empowerment – is a central FFS outcomes that needs to be captured by an evaluation study. Therefore, evaluation methods designed for top-down development projects with a strong pre-determined focus, which in the case of FFS for instance could be improved farming skills that translate into increased farm returns, might not be adequate/sufficient? to appreciate the overall value of FFS (Murray, 2000). A narrow approach which does not include at any stage beneficiaries' voices is likely to miss out on relevant effects, including unpredictable and unwanted ones that could be relevant to project improvement and change (Greene, 1994; Goddard & Powell, 1994, Mohr, 1999). Qualitative and participatory designs are essential to identify the right questions to ask and therefore to establish the validity of the projects' outcomes. Assessing FFS impacts at village level therefore requires the incorporation of components of several approaches to cover a variety of multidisciplinary topics: improved economic well-being, improved knowledge and analytical capacity, diffusion of knowledge from farmer to farmer, decreased health risk and a healthier ecosystem (Waibel et al., 1998). Various FFS evaluation studies have addressed one of the specific impact categories (Chung et al., 1998; Pincus, 1999; Murphy et al., 1999; Virasat, 1999; Khalid, 2002). However, a village/household study that documented the changes in environmental indicators, occupational health, labour use and agronomic practices introduced by FFS in the same selected communities was not available to the author knowledge.

Research design and methods used in the evaluation

The evaluation was carried out from 2002 to 2004 and aimed to assess the short-term effects of FFS (1-2 years after the intervention). The aspects of sustainability taken into account were reduction in environmental pollution, improved people's health and increased social capital. The study was not meant to provide an assessment of the overall FAO-EU IPM Programme regional impact (with random sampling of the total FFS participants population), but to investigated the FFS potential towards the selected impact categories. It focused on a rather small number of villages (up to 12). A team of project officers, facilitators, farmers and outsider evaluators were involved in the planning and implementation of the study. The evaluation was multidisciplinary and based on objective measurements as well as participatory methods. The overall design was quasi-experimental, i.e. it took the FFS as the treatment variable and studied the pre and post, with and without (control) treatment situation. The control was chosen among farmers from the same village who did not attend FFS and, in some cases, farmers who belonged to villages where FFS were never conducted. The matching criteria used to select control farmers were land-holding and farming practices. Baseline data sets (pre) were collected before the start of the FFS, whenever needed it and possible. Specifications on the methodologies used are given below:

1. Ecological analysis of conventional and IPM farming systems to estimate the ecological footprint using Life Cycle Analysis (LCA) (Guinee, 2000; Wegener Sleeswijk et al., 1996). LCA evaluates the

mass balance of in- and outputs of systems and convert these into environmental categories (indicators) that relate to human health and ecological effects. It embraces all elements involved in the production of the item under study (ISO, 2001). This analysis was conducted in 15 conventional and 10 IPM cotton-growing farms. An additional 12 certified organic farms were included in the study to support future project orientation towards organic farming. Data on input use were retrieved from farm' records and farmers' interviews at household level. This component included the FFS and control cases, but only post FFS information.

2. Health assessment to determine the impact of occupational exposure to pesticides on farmers' health, using a self-reporting tool (Murphy et al., 1999 and 2002). Women attending the FFS organised in their respective villages filled in health-monitoring forms for eight months in two seasons after having been exposed to a variety of pesticides. In addition to self-reporting, women filled in forms for a male family member of the family. Forms were filled in as a result of spraying pesticides in the field, mixing chemical solution and refilling spray tanks, working in field sprayed within the same day. Only the signs and symptoms that occurred during the working session or within 24 hours after exposure were recorded. At each FFS meeting the forms were reviewed. The reporting included a list of 18 signs and symptoms of acute poisoning and details on the field operations. The monitoring was repeated pre and post FFS. The control case was initially included in the study; however the response from the farmers non associated with the FFS programme was poor and the data collection for the group was soon suspended (Mancini et al, 2005).

3. Sustainable Livelihood Analysis (Chambers and Conway, 1991; Scoones, 1998; Ashley and Carney, 1999; DFID, 1999) using the five capitals concept: Financial, Human, Social, Natural and Physical. SLA seeks to provide a framework for addressing the complexity and multiple dimensions of people's livelihoods in a systematic way. It is based on the implicit assumption that a stronger and more sustainable capital base is inherently empowering (Bartlett, 2004). Respondents elicited the meaning and asset stock assigned to each of the five capitals. Individual spider diagrams representing the pre and post scenarios were constructed through a process of semi-structured dialogue and visualisation. Results at group level were afterwards consolidated by the evaluators. This components included the FFS and control cases, pre information on a recall basis.

4. Photo-based self reporting of participants' perceptions (photo-visioning, see www.photovoice.com) of impact. This method enables people to record and reflect their livelihoods' issues by using cameras. The picturing technique is unstructured with no prior indication of 'impact domains'. It is not based on immediate farmers' responses and therefore allows time for reflection.

5. Farming Systems Analysis, including labour use. The study proposes an analysis of the changes in agronomic practices and labour use induced by the adoption of IPM. The analysis aimed to investigate if IPM farms had moved towards a more sustainable crop management by reducing the use of chemical inputs, without sacrificing crop productivity. Labour patterns and labour intensity of the same systems were analyzed in relation to IPM adoption rate. Data were collected at farm' level before and after the

FFS year for the FFS and the control cases. The labour questionnaire was developed using the Socio Economic and Gender Analysis (SEAGA) tool (Norem, 2001; Wilde, 2001).

Data analysis

The five components generated quantitative data, in addition to qualitative data, which were analysed using parametric or non parametric statistical approaches according to the requirement. A list of the statistical methods and softwares used is provided in Table 1. A primary analytical concern was controlling for external factors in the attribution of changes to the treatment (FFS). The double delta design (pre- and post; with and without cases) was chosen for the SLA and the Farming System Analysis because has the advantage to control for any built-in, systematic, pre/post change due to causes other than the treatment. In the photovisioning, the respondents established the relation of causality between inputs and changes, however this does not exclude biased attributions as discussed later on in the paper. The LCA compared different managements at one point in time, and not changes.

Table 1. Statistical analysis and computing support (softwares) used.

	Statistical approach	Software
LCA	Canonincal discriminant analysis	Canoco (ter Braak and Smilauer, 2002)
Health monitoring	Linear trend analysis (frequencies analysis and chisquare test)	SPSS
SLA	Multivariate analysis (multiple linear regression)	Anthropac4 (Analytic Technologies, Harvard, MA)
	Consensus analysis	Test (van der Waerden, B. L., 1969)
	Wilcoxon Matched-Pairs Signed-Ranks Test	SAS version 6 (SAS Institute, 1994)
	Step-wise and canonical Discriminant analyses	
Farming Systems Analysis	Two-way anova with time as repeated measure	
	Canonincal discriminant analysis	SAS version 6 (SAS Institute, 1994)
Photo-visioning	Text analysis	Atlas.ti (Scientific Software Development, 2004)

General findings generated by the evaluation

The evaluation focused on IPM FFS outcomes and impact. For instance, the LCA estimated impacts on the environment (e.g. global warming) and the health monitoring actually measured impacts on people's health (extent of pesticide poisoning in part1, improved health in part 2, not yet published). The Farming Systems Analysis dealt with outcomes (changed agronomic practices, yield levels), while the SLA and the photo-visioning reproduced farmers' perception of impacts.

In this session, a summary of the main findings generated by study is provided:

1. Life Cycle Analysis. The LCA focused on a selected number of environmental indicators namely Environmental Index Quotient, Global World Warming, Acidification, Euthrophication and Soil Erosion. It showed that, on an average, organic farms have by far the lowest potential impact – with respect to the five indicators chosen- followed by the IPM farms. However, yields in organic cotton

farming were nearly 50% less than in IPM farms and 20% less than in conventional farms (results submitted for publication: Karst et al, 2005).

2. Health monitoring. The study documented the serious consequences of the pesticides use on farmers' health and specifically on women field helpers. 83.6% of the reported events were cases of mild to severe poisoning and only 16.4% were asymptomatic. Thanks to the gender-aware approach, hidden roles performed by women in the typically male domain "pesticides" became visible. And remarkably, no significant differences were found between the extent of poisoning experienced by women and men (results published: Mancini et al. 2005a).
3. Sustainable Livelihood Analysis. The SLA showed that, from FFS participants' own point of view, the FFS experience yielded significant empowerment gains in terms of the five capitals, natural, physical, financial, social and human. These gains partially extended to the control farmers showing a spill over effect of the training. FFS households and production systems showed an improved resilience to shocks by coping with a severe drought without having to run down their physical and financial assets. (results submitted for publication: Mancini et al, 2005b).
4. Photo-visioning. The pictures taken were grouped by the farmers in the photo-visioning workshop into clusters ("nodes") connected by linkages. This process brought about new insights on unpredicted impacts such as improvement in animal health and production as well as in non-target crops management. (results submitted for publication: Mancini et al, 2005b).
5. Farming System Analysis, including labour use. The data are still under processing, however the first preliminary results showed that on the overall, the total labour requirement was similar in FFS and control farms. The shift to IPM had reduced the time allocated to risky operations e.g. handling toxic compounds and introduced new tasks e.g. installing pheromone traps with lower occupational hazard.

Considerations on the methodological approach of the evaluation

Degree of participation in the evaluation

Before engaging in a SWOT analysis, we need to define to what extent the evaluation was participatory in a continuum from no participation to complete participation. On the overall, outsider evaluators planned the evaluation, defined objectives and choose the instruments. Some of the methods used involved a certain degree of respondents' participation. Adopting the criteria described in Cousin and Whitemore, 1998; Lawrenz, 2003, the following four aspects were considered to compare the degree to which each methodology was participatory: (1) the type of evaluation information collected, such as defining questions and instruments; (2) whether or not to participate; (3) what data to provide; and (4) how to use the evaluation information. The types of participation in decision making for each of the examples are outlined in Table2. The LCA and the Farming System Analysis represent the no-participation end being based on a questionnaire developed on a reference-basis and leading to findings of difficult sharing with the local communities. The health-monitoring used a fixed format for data collection developed by medical specialists. However, the data collection had the additional educational value of being built in the FFS' curriculum as a training component on occupational hazard.

Participating farmers took the ownership of the monitoring and used the information to make decisions in terms of farming practices. Given the framework, farmers decided the type of information to be collected under each capital for the SIA. The findings generated were potentially useful to project implementers as well as farmers. Closer to full participation, or empowerment evaluation as defined by Fetterman (1996) was the photo-visioning where farmers carried out the entire evaluation process till data analysis and processed the information into a community' commitment to move towards more sustainable farming management's. However, whether the commitment translated into an action plan or not at farmers' level is not known by the author who did not visit the studied area ever since. In terms of project' implementation, an improvement of the strategies based on the evaluation' findings was not possible due to the end of the specific FFS Programme. And perhaps this is one of the limitations of long evaluation processes. However, similar programmes can benefits of the lessons learned.

Table 2. Participation of Farmers in Program Evaluation decision making

<i>Method</i>	<i>Time implementation relation to FFS</i>	<i>of in</i>	<i>Information to be collected</i>	<i>Participation in Evaluation</i>	<i>Provision of data</i>	<i>Use of evaluation information</i>
Life Cycle Analysis	Cycle 2 nd year after		Outsider evaluators	Not required	Structured interview schedule	Evaluators, researchers, policy makers
Farming Systems Analysis	Pre and Post (1 year)		Outsider evaluators (partial involvement)	Required to define data collection	Structured interview schedule and Focus Group Discussion	Evaluators, project implementers
Health monitoring	During and Post (1 year)		Outsider evaluators	Required	Pre-developed format	Project development Farming communities
Sustainable Livelihood Analysis	1 st and 2 nd year after		Outsiders farmers	and Required	Open questions	Farming communities
Photo-visioning	1 st year after		Farmers	Required	Farmers' decision	Farming communities

Strengths and limitations of the conventional methods used (e.g. LCA and Farming Systems Analysis)

The ecological study was based on global-scale indicators and aimed to generate comparable and repeatable results. It therefore required an objectivist approach, which ensured an impartial evaluation and allowed for generalisation (Feuer, Towne, and Shavelson (2002). It generated insights relevant at national level to policy advisers and cotton producers to minimise pollution. However, the methodology also has a number of limitations. The indicators are mainly based on simplifications and comply with a theoretical farm system which can be quite far from the real scenario (Wegener Sleeswijk, 1996). As it is often the case with modelling, the precise effect of local circumstances is generally not known and this may influence conclusions, if comparisons are made with other regions in the world. Some environmental aspects such as pesticide use' impact on biodiversity, drinking water quality, human and animal health as well as water consumption were only partially or not at all addressed due to the unavailability of reliable

data in the study area. The Farming System Analysis was a classical application of a questionnaire survey on practices. Both methodologies can be applied at regional level as well. Even though biases are often mentioned among the limitations of participatory methods, methods which draw information from people are likely to share the same risk. In conventional methods, respondents usually do not have a personal involvement in the exit of the study. If this might ensure higher objectivity, it can also result in less motivation to provide accurate and precise information. For instance, in a context of agrarian subsidies and assistance such as the Indian rural society, there might be vested interests to over or under report information regarding yield, input use or production costs.

Strength of participatory methods used (Health-monitoring, SLA and photo-visioning)

Participatory approaches are likely to increase data validity and accuracy resulting in a general enhancement of the evaluation relevance. It's of primary importance to the evaluation validity defining which domains should be investigated and what research questions need to be asked. If the program evaluation is independent from the projects implementation, it may fail to capture the unique aspects of the local context (Lawrenz et al., 2003). In the case of the current impact study, the SLA and the photo-visioning were instrumental to establish that the overall study was pointing in the right direction. The SLA established the inner validity of the FFS intervention by analysing the farmers' cultural domain. It showed that production, environmental and health issues were indeed of primary importance to farmers. But it also showed that farmers appreciated impacts generated by FFS much beyond the adoption of Integrated Pest Management. The SLA had a number of evaluative functions such as process analysis, analysis of relational aspects and systemic interactions, which highlighted indirect not easily detectable effects. In light of this, the two methodologies seem particularly suitable to identify evaluation objectives and to plan impact studies.

In terms of contribution to a higher accuracy, participatory approaches – whether applied to project or evaluation - shift the ownership of the project towards the beneficiaries, who are likely to develop a stronger commitment towards the project's objectives. It has already been observed that people who are motivated by this feeling of ownership provide more complete and accurate information (King, 1998). The analytical process of participatory evaluation can bring about or prepare the ground for solutions to the investigated issues. For instance, the health monitoring facilitated farmers' understanding of the occupational hazard of handling pesticides. This increased sensitization translated into a lower use of chemicals; however it is difficult to attribute the change to the monitoring alone as the activity was embodied in a larger educational effort, the FFS.

In the case of conventional projects with objectives defined without the beneficiaries' involvement, participatory evaluation can help to confirm the validity of the project's objectives.

Limitations and bias

Project participation could also be viewed as contributing negatively to the objectivity of a program evaluation as the respondents, who may have a stake in the outcomes of the study, can introduce

strategic bias. The author also shares Scriven's concern (2005) that the extensive and sympathetic interaction between project participants and evaluators (it is reminded here, that this study was primarily conducted by outsider evaluators associated with the project for long time) can be another source of possible bias. In the health monitoring the women were likely to be positive and involuntarily biased towards reporting higher level of poisoning. The authors estimated the level of the over reporting at something between 17 and 38% by introducing 3 dummy symptoms in the reporting format. In the SLA a general optimistic attitude among male FFS participants was noticed, which resulted in a uniform increase in the capital stocks reported. In order to check for this bias, each individual diagram was retrieved and visualized. The resulting pictures showed that the apparent uniformity was the result of a compensating effect among diagrams remarkably different from each other. Therefore, the reporting in this case was considered reliable. However, the author believes that the risk of bias due to the enthusiastic affiliation with the FFS programme persists.

The language used to conduct participatory methodology is unmistakably the one spoken by the local communities. However, if the stakeholders involved speak different languages and/or the scope of the evaluation goes beyond the use at community level, the language can constrain a good analysis. The authors of this study largely relied on translated texts and this might have limited their appreciation of subtle differences among the respondents' reports. On the analytical front, non-parametric analyses such as the consensus analysis do not have clear threshold values and the strength of consensus cannot be measured. Often baseline data are derived from recall information and therefore reflect a retrospective perception, which is likely to be less accurate (memory bias).

Finally, those methodologies can be very time-consuming and are suitable for village/household application

Participation and Gender

Participatory methods with an inclusive approach (Merterns, 2003) seek out to fairly represent disadvantaged groups in the evaluation process. This is possible if the instruments used are sensitive towards the power relations existing among the participants related to ethnic, gender, age, class, religion cultural and other features. Indeed, participatory techniques are not *per se* gender sensitive. Particularly, Participatory Research Appraisal (PRA) – with which FFS has some elements in common – with its effort to establish a community consensus, might leave the priorities of weaker groups unexpressed or unaddressed. FFS in India have encourage the enrolment of women and the poor in many ways (conducting gender-analysis of cotton farming, involving women leaders in organizational meetings, conducting gender sessions for FFS facilitators, training women facilitators, to mention some). The strategy resulted in the formation of heterogeneous groups attending FFS where it was implemented. The study was conducted in some of those villages with mixed participation with the specific objectives of including women and small farmers in the evaluation. A part from the LCA focusing on farms, the other analyses included segregated data from men and women participants with different socio-economic profiles. A large number of Focus Group Discussions, labour calendars, gender division of

roles in cotton farming were conducted to define the data collection tools. The list of operations to be included in the labour data sheet was developed by male and female farmers and included a number of secondary operations, often overlooked in studies. The health-monitoring made an attempt to describe which groups of people were more exposed to occupational hazard. It included among the monitored tasks minor operations performed by women as mixing the products and re-filling the tanks that turned out to be very risky. The SLA revealed that the process of personal growth stimulated by the participation in FFS was particularly relevant to women, who developed the confidence to speak out for their needs and opinions. Mainstreaming gender in the evaluation design was made possible by the long association with the area (of the evaluators) and the big deal of participant observation carried out in the field. A good start in designing an evaluation – regardless how much participatory is going to be - is recognizing that most of the required information are with the local people and a consultation process with them is likely to give a finer tune to the evaluation.

The current study can be considered gender-aware as it produced segregated information on outcomes and impact, but is still far from being a gender-sensitive evaluation as it did not attempt to analyze who was not and why was not represented in FFS, neither it addressed eventual social changes in the power relations between people to be attributed to FFS. In those villages where only-women FFS were conducted or landlords and labour sat together, conflicting interests among people belonging to different socio- economic classes became evident and sometime overrode gender differences. Capturing these aspects was beyond the initial scope of the evaluation and not at reach of the methods used. However, this dimension would have undoubtedly enriched the value of this work.

Conclusions

The evaluation study applied a range of methodologies from conventional to participatory. The two approaches made different, but equally rigorous, claims to knowledge. The former provided an objective measurement of the environmental and social impacts generated by different cotton production systems. The findings generated are particularly relevant to refine the technical content of the IPM FFS curriculum as well as national plant production and protection policies to minimise pollution and sustain farmers' returns. The later described farmers' appreciation of the same changes introduced in the systems by the IPM FFS project. It revealed that the same outcomes had different impacts on the livelihoods of women and men, of wealthy and poor farmers by giving them the opportunity to express their voices. Those findings are particularly relevant to tune IPM FFS strategies and goals. The incorporation of different approaches, and consequently of a variety of methodologies, broaden evaluation' viability and accuracy – as already indicated by evaluation specialists (Bledsoes, 2005; Scriven 2005).

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