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Improving the Monitoring and Evaluation of Agricultural Extension Programs

By Murari Suvedi and Gail Vander Stoep

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Improving the Monitoring and Evaluation of Agricultural Extension Programs

MEAS Discussion Paper Series on Good Practices and Best Fit Approaches
in Extension and Advisory Service Provision

Dr. Murari Suvedi (Michigan State University)
Dr. Gail Vander Stoep (Michigan State University)

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The Modernizing Extension and Advisory Services (MEAS) Discussion Paper series is designed to further the comparative analysis and learning from international extension efforts. The papers contain a review of extension and advisory service best practices drawn from the global body of experience in successfully reaching resource-limited farmers. The papers identify the underlying principles associated with high levels of success in reaching women and men farmers and how, in differing contexts, these core principles have been successfully adapted to fit local conditions in establishing productive, profitable and sustainable relationships with individual producers, producer groups, the private sector and associated research and education institutions.

The series, and the companion MEAS Working Papers, include papers on a wide range of topics, such as the realities of pluralistic extension provisioning, sustainable financing, human resource development, the role of farmer organizations, linking farmers to markets, the importance of gender, health and nutrition, use of information and communication technologies and climate change adaptation. The papers target policy makers, donor agency and project staff, researchers, teachers and international development practitioners. All papers are available for download from the MEAS project website, www.meas-extension.org.

The Editors,

Brent M. Simpson, Michigan State University, and
Paul McNamara, University of Illinois Urbana-Champaign

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Introduction

Agricultural extension services exist throughout the world. Their primary function has been to facilitate learning and extend new knowledge and technologies in non-formal educational settings to improve agricultural productivity and increase farmers' incomes. This knowledge and new technology can originate from research institutions, peer farmers, or the broader community. Agricultural extension systems have evolved such that extension workers are trained for and engaged in the communication of agricultural research findings and recommendations to farmers. However, as extension workers everywhere know, just because 'knowledge is extended' through training, demonstrations, and other strategies of information dissemination, new behaviors and implementation of new practices are not automatic. As expressed by Rogers (2003), diffusion of agricultural, economic, and other innovations is complex and must consider diverse factors that facilitate or inhibit diffusion of new knowledge and innovative practices. Evaluation can help to discover and understand those factors in diverse contexts.

Box 1. Accountability Questions Asked by Entities Funding Extension

- **Should the government and donors continue to fund extension programs?**
- **Are the extension programs effective?**
- **How would you improve or terminate ineffective extension programs?**
- **What new programs should be implemented to meet the needs of farmers, or to address changes of the rural agricultural clients you intend to serve?**

Most countries have some type of system for agricultural extension, with an overarching goal to enhance food and nutrition security through increased agricultural productivity and profitability. Yet, extension services are organized in many ways. Different countries have created different types of extension systems based on purpose, goals, context, and types and level of external support. Most agricultural extension services are managed as public goods. In some countries, they are delivered in collaboration with agribusinesses, such as seed, fertilizer, and pesticide providers, and often have a focus on technology transfer. Many countries emphasize advisory work by responding to requests from farmers and agribusiness operators. Recent developments have led to decentralized and pluralistic extension systems through which a variety of providers assist farmers in forming groups, marketing their agricultural products, and partnering with a broad range of service providers, such as credit institutions. Additionally, extension services often support human resource development and facilitate empowerment (Swanson, B. and R. Rajalahti 2010).

Setting up extension operations has been one of the largest institutional development efforts in developing countries (Anderson, J.R. and G. Feder 2004), with hundreds of thousands of extension professionals engaged. However, faced with declining public budgets and the need to support many development programs, policy makers and funding agencies increasingly are demanding information about how extension program funds are used and about the impacts of these programs (see Box 1). As a result, there is a growing need for monitoring and evaluation.

This chapter describes the need for monitoring and evaluation and addresses many issues related to improving the quality of measuring impacts of agricultural extension services using rigorous but cost-effective methods. It provides guidelines for reporting extension outputs, client satisfaction with extension services, and some outcomes. It also describes strategies for improving evaluation practice across numerous facets of evaluation. The chapter concludes by reiterating the importance of building local evaluation capacity and re-emphasizing the need for disseminating and using results to improve extension programs/services and their impacts.

Description and relevance of program evaluation

Evaluation is a process of systematically assessing the operation and/or outcomes and impacts of a program or project by collecting evidence to determine if certain acceptable standards have been met and to answer other relevant questions (see Box 2). This implies that clear, measurable objectives are created for each program or project prior to its implementation. Evaluation results based on these predetermined objectives, as well as assessments of unintended consequences, are used to improve the program or project, or to decide that it should be disbanded.

Evaluation is not a new concept. It is something we all do, informally or formally. In informal settings, every human engages in some form of evaluation every day when making judgments about what we do or experience, and to help us make daily decisions. Choice-making requires cognitive analysis that involves judging, appraising, or determining the worth, value, quality, and/or impacts of various options. The most important, and the most difficult, judgment to make is determining the value of a program (Steele, S. 1975). A highly valued program is likely to receive continued or additional funding and other support. However, "value" is not a singular, concrete factor across all contexts. Rather, "value" is based on conscious and subconscious criteria. Thus, clear criteria for, or indicators of, value should be identified early in the project/program planning process and reflected in clear, measurable objectives.

Informal and formal evaluations can anchor two ends of a continuum. At one end of the continuum, informal evaluations are unsystematic; criteria and evidence used in making judgments are implicit and often personal. They can, therefore, be biased and misleading (Seepersad, J., and T.H. Henderson 1984). At the other end, formal evaluations are systematic and use explicit criteria and evidence to make judgments about a program's relevance, effectiveness, efficiency, and/or impacts (Horton, D. et al 1993). Findings are made public, partially to defend conclusions and partially to solicit review and validation by others.

Box 2. Evaluation to Determine Project or Policy Effectiveness

- **Program Effectiveness:** Focus is on effectiveness of an intervention (program, project, or policy) in meeting objectives.
- **Resource Effectiveness:** Focus is on analysis of benefits and costs of an intervention, including cost per beneficiary.
- **Service to Diverse Audiences:** Focus is on which programs, policies, and practices are most effective with different target groups (e.g., women, ultra-poor, ethnic minorities).
- **Experiential Effectiveness**: Focus is on how users of extension services perceive service quality, or their intention to use new information and/or technology.

Evaluation is both an art and a science. The art of evaluation involves identifying purposes and audiences, creating appropriate designs, and interpreting data about a program or policy. The science of evaluation involves systematically gathering and analyzing evidence about the outcomes and impacts.

Monitoring and evaluation

Monitoring helps to ensure that programs are implemented in accordance with their design and objectives, and helps answer questions such as "Are we doing the right thing? Are we doing it right?" Extension managers use monitoring to track progress by gathering periodic information on project inputs and activities and, based on data, adjust an ongoing program's personnel, resource allocation, and/or staff recognition, and often are linked with formal impact assessments. Most extension systems have set up a data collection system on what extension program is offered to whom, where and how many benefitted, etc.

Generally, extension managers track resources (e.g., funds, personnel, and supplies) and processes (e.g., occurrence of meetings, demonstrations, and publications). Ideally, monitoring is built in to projects so that key indicators of progress throughout a program or project can serve as a basis upon which to evaluate outcomes of the intervention (Khandker, S. R., G.B. Koolwal and H.A. Samad 2010).

Box 3. Examples of Questions for Formative Evaluation as Part of Monitoring

- **Are farmers receiving agronomic information in a timely manner?**
- **Are extension meetings attracting a sufficient number of farmers for successful implementation of a program or project?**
- **Are demonstrations conducted as planned?**
- **Are farmers adopting new practices?**

Impact evaluations are used to provide evidence about whether or not specific extension programs are good investments. They are based on the comparison of observed changes in the project target outcomes (e.g., changes in a target population, quality of some resource or life condition, production levels, economic gains) from prior to and after the launch of the project/program or implementation of a policy. They utilize quantitative analysis, using a counterfactual (i.e., control group) to estimate the extent to which changes in impacts can be attributed to the project intervention. Usually, impact assessments use an experimental or quasi-experimental design. (See examples in Box 3.)

Most public extension services have a general monitoring and evaluation unit. These units gather periodic data on several general output variables, including number of female and male participants, types of extension activities implemented, crop and livestock activities and conditions, market information, and ongoing and emerging educational needs of their clientele. In an effort to improve monitoring effectiveness, Misra (1998) offers 10 principles for successful and effective monitoring (see Box 4). However, public extension services have not been able to make full use of monitoring data for specific program improvement and personnel management purposes.

Monitoring of program performance and impact evaluation are related, but they require different methods and levels of rigor. Monitoring tracks key indicators of progress over the course of a program to provide contextual descriptions as a basis on which to evaluate outcomes of the intervention (Khandker, S. R., G.B. Koolwal and H.A. Samad 2010). Similar to monitoring, operation evaluation seeks to understand whether or not implementation of a program has unfolded as planned. The aim is to compare what was planned with what was actually delivered to determine if gaps exist between planned and realized outputs (Khandker, S. R., G.B. Koolwal and H.A. Samad 2010).

Box 4. Misra's Ten Principles for Monitoring *(1998)*

1. **Monitoring must be simple.** A complex or complicated monitoring system is self-defeating.
2. **Monitoring must be timely.** Timeliness is critical so that appropriate modifications in a project or program can be made soon enough to increase chances for project success.
3. **Monitoring must be relevant.** Monitoring must match objectives, generate useful information.
4. **Monitoring information should be dependable.** Management will rely on monitoring findings only if the information is believed to be reasonably accurate.
5. **Monitoring efforts should be participatory.** It should include all stakeholders concerned with extension (e.g., field-level personnel, subject-matter specialists, extension clients [farmers]).
6. **Monitoring must be flexible.** It is iterative in nature, and becomes routine over time.
7. **Monitoring should be action-oriented**. It should follow pragmatic approaches, keeping requirements of extension's clients uppermost in consideration.
8. **Monitoring must be cost-effective.**
9. **Monitoring efforts should be top-management-oriented.** Monitoring units should keep in mind requirements of top management when designing and operating a monitoring system.
10. **Monitoring units represent specialized undertakings**. Monitoring is not merely concerned with the collection and analysis of data, but with diagnosing problems and suggesting alternative practical solutions.

Challenges in Evaluation of Agricultural Extension Programs

Agricultural extension organizations are complex. The structures of extension organizations, their goals and objectives, methods of information delivery, and accountability requirements are not uniform. In most countries, the goal of agricultural extension has been the transfer of technology or improved farming practices. In some countries, extension focuses on non-formal education to farmers. Thus, it is not possible to offer a recipe for best practices on monitoring and evaluation. Therefore, the remainder of this paper presents common problems and issues associated with monitoring and evaluation of agricultural programs and offers suggestions to address these issues.

Extension is complex and evaluation is messy

People hold different meanings of evaluation. Evaluation professionals use a wide array of research methods, ranging in rigor and complexity from casual observation to randomized experimental design. In the context of agricultural extension, however, program evaluation is not a common practice for various reasons. Staff members may lack evaluation capacity; the organization does not have the necessary support structure and services, such as in-service training, to promote the use of evaluation; or no funds are allocated to finance evaluation.

Extension service is a public good in most countries. Generally, it is not required to provide impact data. Also, it is difficult to attribute specific impacts at the farm level to extension services because many factors affect the performance of extension services. Such factors include budget allocation, timely release of funds, staff motivation and incentives, timely availability of inputs, and accountability (both upward to management and downward to clients) (Anderson J.R. and G. Feder 2004).

There are two schools of thought about evaluation of public non-formal education programs such as agricultural extension. One school believes that evaluation involves value judgments and, thus, absolute accuracy is neither necessary nor attainable. Therefore, evaluation should be structured to serve as a learning process. The other school considers that evaluation is useful only insofar as it provides credible evidence to inform real-world decision-making. This school believes that sound evaluations are based on empirical evidence or data. Accordingly, program evaluators should be able to identify cause-and-effect relationships between an activity designed to induce change (such as a demonstration of home garden) and a particular desired outcome (such as increased vegetable consumption resulting in improved nutrition of family members). This requires fairly good evaluation design and statistical knowledge to analyze impact data.

Determining cause-and-effect relationships may require experimental or quasi-experimental research designs in which an experimental group (or groups) receives a specific treatment(s) while the control group receives no treatment. Use of a control group (also termed a comparison group or counterfactual) enables evaluators to discount many alternative explanations for the effect of the treatment. So, comparisons are essential in scientific investigations. In the case of extension, comparing farmers receiving extension services with an equivalent group receiving no extension services makes it possible to draw well-supported conclusions. However, to guide such evaluative studies, program managers and policy makers must understand basic research designs, gather sound data, and use statistical tests to determine if changes are due to extension programs. Additionally, they must be able to communicate impact information to stakeholders. Lack of or limited capacity in these skills, combined with limited funding to hire evaluation specialists, creates challenges to conducting comprehensive and timely evaluations of extension programs.

Furthermore, conducting an evaluation does not ensure that results will be used for program improvement. Many factors influence the use of evaluation results. An evaluation report may be only one of many sources of information for decision makers, who may also get less formally collected information about an extension program from advisors, colleagues, farmer organizations, interest groups, and/or the media. Some decision makers may not be interested in making programmatic changes if they are moving out of extension work and, thus, have no personal vested interest. Others may not implement recommendations because of ideological or political reasons. Often, implementing recommendations requires more resources than are available. Thus, understanding decision makers, stakeholders and the real potential for use of results is critical to deciding whether or not to conduct a specific evaluation.

From inputs, outputs, and outcomes to impacts: Improving what and how we evaluate

Evaluations of agricultural extension programs historically have not focused on long-term impacts. Often, extension educators gather demographic information about participants. Sometimes they administer end-of-program evaluation surveys to ascertain positive or negative perceptions of the program, and then associate these perceptions with socio-demographic characteristics such as sex, race, residence, or educational level. This information is integrated with other activities of the organization and reported to national level decision makers. Although information about outputs and perceptions is helpful, it does not provide information about the impact of the extension program or service.

Acknowledging this weakness, USAID now is placing considerable emphasis on measuring and documenting project achievements, impacts, and shortcomings using rigorous evaluation methods. The new evaluation policy of USAID (2011) defines impact evaluation as that which:

"…measures the change in development outcome that is attributable to a defined intervention; impact evaluations are based on models of cause and effect and require a credible and rigorously defined counterfactual to control for factors other than the intervention that might account for the observed change. Impact evaluations in which comparisons are made between beneficiaries that are randomly assigned to either a "treatment" or a "control" group provide the strongest evidence of a relationship between the intervention under study and the outcome measured" (p. 4).

As indicated earlier, "impact" means lasting or longer-term effects. What difference did the extension program or project make in the lives of the people? Did it improve food availability or food utilization? Did it increase local use of local foods and reduce incidents of illness? Did it increase income? Despite USAID's recent policy that strongly encourages use of experimental designs to assess causal impacts of extension programs, most agricultural extension programs have yet to utilize rigorous evaluation methods due to the high costs in time, resources, and money. Many extension systems do not have staff trained in experimental methods and statistical analysis. Therefore, traditional methods, results of which can be useful for some purposes, still are employed most often.

Experimental evaluation studies to measure changes

Evaluators of agricultural extension services and programs have a variety of methodological approaches from which to choose, depending on the context, the length of project implementation, purpose of the evaluation, and logistical constraints. Experimental studies, as indicated previously, provide the most rigorous and direct assessments of cause-and-effect outcomes of extension programs and services. A pre- and post-program evaluation can explain whether the program has had any effect on the participants. Two sample evaluation questions for a pre-/post-program assessment are: Do farmers who attend extension meetings adopt hybrid corn varieties earlier than those who do not? Do farmers who attend extension meetings generate a higher net income per hectare than those who do not?

Three ingredients are essential in the conduct of an experiment: control of the research context; manipulation of the independent variable(s); and observations or measurement of change(s) in the dependent variable(s). Control of context means providing a carefully controlled situation in which the effect of the variable of interest (independent variable) can be investigated. Manipulation is the process of creating different treatment groups or conditions to facilitate observation of the impacts of independent variables on dependent variables. Observations are made, via use of various measurement tools or strategies, with respect to specified characteristics/conditions of the dependent variable(s).

Experimental studies typically are framed with one or more hypotheses that express a prediction that the treatment(s) applied in the experiment will have certain effect(s) on the dependent variable(s). The experimental group(s) receive(s) a specific treatment while the control group receives no treatment. Use of a control group (comparison group or counterfactual) enables the researcher to discount alternative variables that might contribute to and provide explanations for the effect. Thus, comparisons are essential in experimental scientific investigation, making it possible to draw well-founded conclusions. A sample experimental design is presented in Table 1.

Table 1: Diagram of Experimental Design for Evaluation

Randomly Assigned?	Results of Pre-Project Measurement	Treatment	Results of After-Project Measurement	Impact
Treatment Group **Random selection of project villages** **Random selection of households from each selected village**	A0	**Extension Project** Households receive new technical assistance and educational support	A1	A1-A0 = Y
Comparison Group **Random selection of control or comparison villages** **Random selection of households**	B0	**No Extension Project** Households receive regular technical assistance from government program	B1	B1 – B0 = Z

In the experimental design illustrated in Table 1:

A1-A0=Y (outcome due to treatment) and B1-B0=Z (outcome without treatment)
If Y is greater than Z, the program has had a positive impact on net outcome.
If Y=Z, the project had no impact on outcome.
If Y is less than Z, the project had a negative impact on the outcome.

This experimental design could use panel data (pre- and post-project data collected from the same households) or repeated cross-section data (pre- and post-project data collected from different households within the same general population in the villages). Both sampling strategies allow comparison between the treatment group and control group (or counterfactual) in terms of changes in outcomes over time relative to the outcomes observed in pre-intervention baseline data. Results of this design provide good evidence of program impacts.

Non-experimental evaluation studies to measure changes

Despite the rigor and appropriateness of experimental evaluation designs, in the context of public agricultural extension and advisory service evaluation, it is difficult to establish a control or comparison group, maintain uniform treatments, and measure long-term impacts. More often extension programs or projects make use of ex post studies for evaluation (see box 5).

Box 5. Types of *ex post* Studies Conducted after Program/Project Completion

Cross-section Surveys: Surveys are popular for collecting evaluative data and are used to measure people's opinions, attitudes, beliefs, behaviors, reactions, and attributes in response to specific questions. Cross-section surveys query respondents within a target population at one point in time.

Case Studies: Case studies use a mix of methods to obtain information that, together, provides in-depth information about a single unit, project, or organization. Using a systematic process, the evaluator captures the essence of a situation through personal discussion and interaction with relevant stakeholders, observation of behaviors and other variables, and/or review of existing documents. Yin (1984) describes case studies as *explanatory, descriptive, or exploratory*.

Focus Groups: Focus groups, which are in-depth guided discussions with a small group representing a target population, traditionally are used in marketing research to find out what a particular segment of the public needs or wants, and what they will consume. In recent years, this technique has been used to identify community needs and issues, to obtain citizens' perceptions on a defined area of interest, and to generate program alternatives. In the case of *ex post* evaluation, focus groups are used to assess the impacts of a particular program on individuals and communities.

Benefit-Cost Analysis (BCA) and Return on Investment (ROI): These are two common types of analysis used to determine the economic feasibility of new technology or development alternatives.

- **BCA** is a tool used to identify, express in money terms, and then compare all the costs and benefits of a policy, program, or project.
- **ROI** is a performance measure used to evaluate the financial efficiency of an investment.

Many administrators and funders are interested particularly in economic impacts. Thus, social scientists with a background in economics also are engaged in impact evaluation. However, valuing the economic impacts of extension programs is not simple. Often, economists depend on secondary data, such as census records, to track impacts. They also utilize surveys to gather information for determining impacts. Richardson and Moore (2000) describe a variety of indicators and tools for valuing economic impacts (see Box 6).

Khandker, S. R., G.B. Koolwal and H.A. Samad (2010) offer econometric methods to address the issue of lack of counterfactual, or control group. Two frequently used methods are 'propensity score matching' and the 'double-difference method.' "Propensity Score Matching (PSM) constructs a statistical comparison group that is based on the probability of participating in the treatment, using observed characteristics. Participants then are matched on the basis of this probability, or propensity score, to non-participants. Average treatment effect of the program then is calculated as the mean difference in outcomes across the two groups." (Khandker et al., 2010, p. 53).

The Double Difference (DD) method compares data on project participants and comparison or control groups before and after the program interventions. This method requires baseline data on participants and members of the comparison group. Follow-up surveys after program interventions should be conducted on the same units. Frequently, evaluators combine both PSM and DD methods, as illustrated by two African case studies in Box 7 below.

Box 6. Indicators and Tools for Valuing Economic Impacts

Reduced Cost: This indicator measures the money saved by a participant. For example, a farmer adopts a less expensive pest management practice after attending an Integrated Pest Management (IPM) training program. The reduced cost is equal to the cost of regular pest management practice minus the cost of the new IPM practice.

Savings: Similar to reduced cost, this indicator identifies the amount of savings or increased savings attributable to implementation of a farming or other practice learned from an extension program, as experienced by participants before and after the program.

Increased Income: This indicator compares the income of a program participant before and after the program. For example, a farmer's income may increase as a result of planting a new variety of rice that has a higher yield per hectare, or because of value-added practices – such as use of improved driers for large cardamom or implementation of organic farming practices – implemented as a result of extension information or training.

Increased Productivity: This indicator is derived by computing economic value by measuring the increase in productivity by the same number of workers or units of production due to adoption of a new practice learned from an extension program or demonstration. For example, extension programs teach farmers how to use a new technology. The higher profits from use of the new technology minus the cost of buying the technology equals increased productivity.

Value Added: This indicator refers to the additional profit, or value, assigned to a crop or product that is used in a new way, or processed in a way that adds value beyond the cost of the processing. For example, a program that teaches fruit farmers to make jam or jelly enables farmers to add value to the fruit. The profit from selling jelly, after costs of making the jelly are considered, minus the profit made from selling the fruit equals the value added.

Expected Value: This method estimates how much income a new business will earn. Banks rely on this method when deciding whether or not to make a loan. The income of similar businesses, along with the quality of the business plan, is used to estimate the income of the new business. For example, extension agents can use this method to estimate the value of an extension program that teaches participants how to start a small business. The combined expected values of the businesses started within a specified timeframe, as a result of extension training offered to potential new business entrepreneurs, could be considered the value of the extension program.

Alternative Opportunity Cost of Capital: Extension programs can teach participants how to make more money by using existing capital in different or more efficient ways. For example, land could be used to grow a higher value crop. The income from the higher value crop is compared to the income from the lower value crop to estimate the economic worth of the extension program that made farmers aware of and assisted them in changing to the new, higher value crop.

Willingness to Pay: The willingness of clients or consumers to pay for some item or service may be considered an economic benefit when this willingness exceeds what would be considered a standard norm for a product or service. If the price of a product is marketed more effectively, is a value-added product, or reaches a new niche clientele as a result of extension training or assistance, this willingness to pay can be considered the value of the extension services.

Source: Richardson, J. G., and C.L. Moore 2002

Box 7. International Food Policy Research Institute Case Studies Using Econometric Methods

East Africa Farmer Field Schools: A longitudinal quasi-experimental evaluation was conducted to document the impact of Farmer Field Schools on agricultural productivity and farmers in East Africa. An *ex post facto* design combining a double difference method, with matching estimators (propensity score matching and covariate matching), was used. Findings indicated that Farmer Field Schools had positive impacts on production and income among women, low-literacy, and medium-land-size farmers. Participation in Farmers Field Schools increased their income overall by 61 percent, and improved both agricultural income and crop productivity.

Source: Davis et al 2011

Pro-poor Development in Nigeria: Propensity score matching was used to measure the impact of a pro-poor community-driven development project in Nigeria. The study selected 1,728 comparable project beneficiaries and non-beneficiaries. The study also used double difference methods to compare the impact indicators. Results showed that the Fadama II project succeeded in targeting the poor and women farmers in productive asset acquisition. Participation in the project also increased the income of beneficiaries by about 60 percent. The project also increased demand for postharvest handling technologies.

Source: Nkonya, E. et al 2008

For practical and limited resource reasons, it is not possible for all agricultural extension programs and policies to be assessed using experimental methods (with randomized sampling) to document impacts of programs and projects on families, communities, and society. In the United States, Duttweiler (2008) examined 675 published evaluation studies and found that the primary purpose for evaluation was program improvement. Most studies used quantitative methods, particularly ex post facto, correlation research, and survey research methods. Most have focused on educational methods improvement, program accountability (including outcome and impact), needs assessments, staff development needs, audience analysis, and customer satisfaction. Use of surveys has been the predominant data collection method for evaluation. However, qualitative methods – focus groups, key informant interviews, and/or case studies – often are utilized to supplement or complement survey data. Such qualitative studies can offer the depth of information needed about program and policy impacts on the intended audiences.

Additionally, mixed method approaches might offer better documentation of outcomes and impacts. Use of mixed methods allows extension managers to both gain in-depth understanding of phenomena related to extension's target audiences, its staff, and programs and to generalize to appropriate populations based on the more rigorous quantitative methods. As interest in assessment of impacts – to supplement recording of outputs and opinions – increases, new tools are emerging to begin to tackle the difficult challenge of assessing long-term impacts. One example is "ripple effect mapping."

Ripple effect mapping

Ripple effect mapping is a qualitative tool used to assess how direct impacts of an extension program or projects may, over time and geography, spread indirectly to others, thus resulting in expanded impacts over time . . . thus, a ripple effect. Additionally, it can be used to identify unintended impacts. Assume that, immediately after a project's or program's completion, traditional impact assessment was conducted. Evaluators might have gathered basic demographic information about program or training participants, such as family size, farm size, crop yields, and household incomes.

Figure 1. Example of Mind Map: Graphic Representation Useful in Ripple Effect Mapping

Source: Burnett, G. 2005

Combined with observed or reported actions taken as a result of the program or training, a direct impact evaluation would result.

To conduct a ripple effect assessment at some time and/or location(s) distant from the original training, representatives of targeted groups (both who attended the program or training and those who did not) are brought together to discuss the direct and indirect impacts of a program resulting from social network communication, observation of successes by early adopters, and other vectors; the ways in which information about successes has spread; and characteristics of "credible others."

Using focus groups, incorporating guiding questions and graphic representations of the vectors and channels for spreading impacts, is one way to implement ripple effect mapping. (Flage, L. 2011; Flage, L. and S. Chazdon, n.d.; Kollock, D. A. 2011) Box 8 presents an agriculture-based example.

Box 8. Example of Ripple Effect Mapping

Assume district X has 5,000 farmers growing rice in a total area of 15,000 hectares. Suppose 100 farmers participated in a training program on rice production. Of these, 20 farmers adopted use of the new variety recommended by extension within the first year after the training/demonstration. After 10 years, an additional 60 of the originally trained farmers and 25 farmers in district X, and 30 farmers in adjacent districts, who did not participate in the training program now are planting the new variety of rice. Extension staff members notice this increase and want to better understand the factors influencing broader adoption of the new rice variety.

To better understand this "ripple effect," extension evaluators convene one or more groups of farmers who are planting the new rice variety, regardless of whether or not they attended the original training. Facilitators guide them through a "mapping" exercise, using graphic drawing tools to record the guided discussions. Participants share their personal stories about when, why, and how they began using the new rice variety. Participants also identify the production results (crop yield and economic gains) as well as other, unintended and indirect, results (perhaps improved health of farm families, more involvement by women, all children attending school). Additionally, social and communication networks (e.g., word-of-mouth, market-place sharing, personal observation, social media, communication via cell phones, radio program production updates) can be mapped to better understand how and why impacts spread over time and space.

Lessons Learned: Strategies for Improving Evaluation Practice

Evaluation in extension and rural advisory services should be a learning process for all involved. Evaluation results should be utilized in improving programs and developing more effective policies to serve rural populations. As part of the evaluation process, the monitoring process should be developed to track key indicators of progress over the course of each extension project. Suggestions are provided in this section for selecting appropriate programs and projects, for enhancing rigor and quality in each component and phase of evaluation, for collaborative work with extension partners, and for effectively integrating evaluation efforts throughout extension programs and services.

Integrating evaluation into design of projects

Planning appropriate and effective evaluation begins with the planning of an extension project itself. First, evaluators and extension personnel must have clear understanding of project goals and objectives, the nature and purpose of interventions planned, target audience(s) to be reached, duration of the project intervention, and resources available (e.g., time, money, staff expertise, partner organizations, and networks). Additionally, stakeholders must be consulted and engaged in selection of evaluation design. Collectively, the following questions should be answered:

- Who wants the evaluation, why, and by when?
- Who will be using the evaluation results, and for what purposes?
- Does the evaluation client seek in-depth understanding of impacts on individuals or social groups, or do they want more generalizable results?
- What resources are available to conduct the evaluation?
- Is the desired evaluation feasible (based on all the above), and is the project of high enough benefit to warrant the expense of formal evaluation?

Based on answers to the questions above, decisions are made about the appropriate duration of the evaluation process (e.g., a one-time study, a pre/post study, or a longitudinal study); which evaluation method, or mixed methods, is most appropriate; and, if assessment of causality is desired, whether an experimental design is needed or a quasi-experimental design is sufficient. Careful attention to a host of factors involved with the selection and design of an evaluation process can enhance the effectiveness, efficiency, and usefulness of evaluation results. These factors are discussed in the following sections.

Choosing appropriate evaluation criteria and indicators

For an evaluation to be valid and useful to the results users, it must employ sound indicators to measure change. Indicators are observable phenomena that point toward the intended and/or actual condition of situations, programs, or outcomes. They are markers that can be observed to show that something has changed or improved. Indicators, when incorporated into an appropriate monitoring system, can help people notice changes at an early stage of a program's implementation. Quality indicators of an evaluation process are that it must be: relevant to project objectives; simple and unambiguous; realizable given logistical, time, technical, or other constraints; conceptually well grounded; and can be updated at regular intervals (see Box 9).

Good evaluations start with baseline data to establish benchmarks. Baseline data are gathered before the start of intervention. Thus, having indicators identified early in a project planning process is critical. This helps to identify truly needed projects as well as to frame effective, efficient evaluations. Also critical to effective evaluation is selection of indicators that are appropriate to the project goals, objectives, and intended impacts. Examples of indicators to evaluate the effectiveness of extension programs focusing on agricultural production would be fundamentally different from programs intended to improve nutrition, even if planting of a new high yield, healthier variety of potato or rice might result in both types of impacts. Box 10 provides examples of matching indicators to different goals.

Box 9. Criteria for Selecting Indicators

An appropriate, effective indicator must:

- be measurable;
- be relevant to the impact being evaluated;
- be easy to use;
- result in representative results;
- be easy to interpret;
- be responsive to changing inputs;
- have a reference against which to compare it;
- be measurable at a reasonable cost; and
- be updateable.

Box 10. Examples of Indicators for Varied Intended Impacts	
GOAL	**EXAMPLES OF INDICATORS**
Increased productivity	Change in yield/unit (e.g., kilograms of rice production per hectare, liters of milk per animal)
Reduced cost	Change in cost of production (e.g., cost per kilogram of meat production)
Reduced inputs	Change in input use as measured by cost/unit (e.g., cost of irrigation or fertilizers/pesticides per hectare)
Improved nutrition of young children	Change in prevalence of underweight children under 5 years of age
Improved health of women	Change in prevalence of anemia (or other diseases or conditions) of women

Measuring and reporting objectively

Evaluation essentially involves measurement of indicators by collecting quantitative and qualitative data. Quantitative methods measure a finite number of pre-specified outcomes and are appropriate for large-scale projects that intend to judge effects, attribute cause, compare or rank, classify, and generalize results. These methods are accepted as credible and applicable to large populations, particularly when generalizability is important.

Qualitative methods take many forms, including rich descriptions of people, places, conversations, and behavior. The open-ended nature of qualitative methods allows the person being interviewed to answer questions from his or her own experience and perspective. Qualitative methods yield good evaluation data as long as they are collected objectively and reported in as unbiased a way as possible.

Selection of methods should consider purpose of the evaluation, quality of evidence, and users of evaluation results. By using mixed methods, quantitative data can be complemented with qualitative information to provide a richer description of impacts.

Validity and reliability of data collection instruments are related directly to objective measurement. Validity asks the question, “Does the evaluation instrument measure what it purports to measure?” One way to assess validity of an evaluation instrument is to use a panel of experts consisting of persons who are knowledgeable of the project being evaluated. Panel members review the instrument in terms of its content, format, and audience appropriateness.

Reliability asks the question, “Does the instrument consistently yield the same results with the same group of people under the same conditions?” Reliability looks for consistency, accuracy, and dependability of an instrument. Usually, reliability is established by conducting a pilot test or pre-test.

A pre-test provides a means of testing the method and instrument before actual data collection in the field. It is usually associated with quantitative methods, though qualitative and participatory methods also can be pre-tested. Pre-testing can prevent costly errors and wasted effort. Box 11 presents questions associated with pre-testing.

A frequently asked question about reliability is, "What value of reliability coefficient is adequate to establish the instrument's reliability?" There is no hard and fast answer to this question. Consider what type and how important a decision is to be made based on the evaluation results. The more important the decision to be made, the higher the reliability needed. Generally, an alpha value of 0.7 is considered the cutoff for acceptable reliability (Kerlinger, F. N. and H.B. Lee 2000).

Box 11. Types of Questions Addressed with Pre-testing

- Are the issues to be discussed, the questions to be asked, and/or the words to be used clear and unambiguous?
- Is the technique or instrument appropriate for the people being interviewed or observed?
- Are instructions for the interviewer or observer easy to follow?
- Are the techniques and/or forms for recording information clear and easy to use?
- Are procedures clear and standardized?
- Will the technique or instrument provide the necessary information?
- Does the technique or instrument provide reliable and valid information?

Selecting appropriate evaluation tools

After deciding on the most appropriate methodological approach to use (quantitative, qualitative, or mixed methods), it is important to select appropriate tools and techniques associated with that method. As with all decisions related to evaluation, the selection of tools and techniques should be consistent with the purpose, user, and intended use of the results; the context for and impacted population to be evaluated; resources available for conducting the evaluation; and the stage of program planning and implementation for which the evaluation is intended. Some examples of evaluation methods, tools, and techniques as commonly used during progressive stages of extension program planning, implementation, and completion are identified in Table 2.

Table 2: Common Evaluation Tools and Techniques by Program Stage

Program Stage	Types of Studies	Typical Questions Answered	Examples of Evaluation Tools and Techniques
Planning Stage	Needs Assessment Feasibility Study Baseline Study	What are the felt and unfelt needs of the audience? Can extension address these needs? Do they fit with extension's mission? Is the program or project socially, economically, environmentally feasible?	Surveys Focus Groups Observation Content Analysis (e.g., of office records) Economic Analysis (e.g., benefit/cost analysis)

Program Stage	Types of Studies	Typical Questions Answered	Examples of Evaluation Tools and Techniques
Imple-mentation Stage	Formative Evaluation Program Monitoring	Is the program meeting its objectives of intended outcomes? Is the audience satisfied with the program? Are the media delivering program messages?	Annual Monitoring Reports (e.g., staff time and activity reports, crop yield, seed cost) Adoption Patterns for New Technology Evaluative Studies of Knowledge, Attitude, and Behavior Change Customer Satisfaction Surveys Content Analysis of News Releases
Concluding or Results Stage	Impact Assessment Summative Evaluation	Has the program addressed the needs or gaps identified? Is the program achieving desired outcomes? Is the program cost effective?	Pre- and Post-project Data Analysis Cohort Studies Panel Studies Surveys (e.g., personal interviews, telephone surveys, mail surveys, online surveys) Economic Analysis

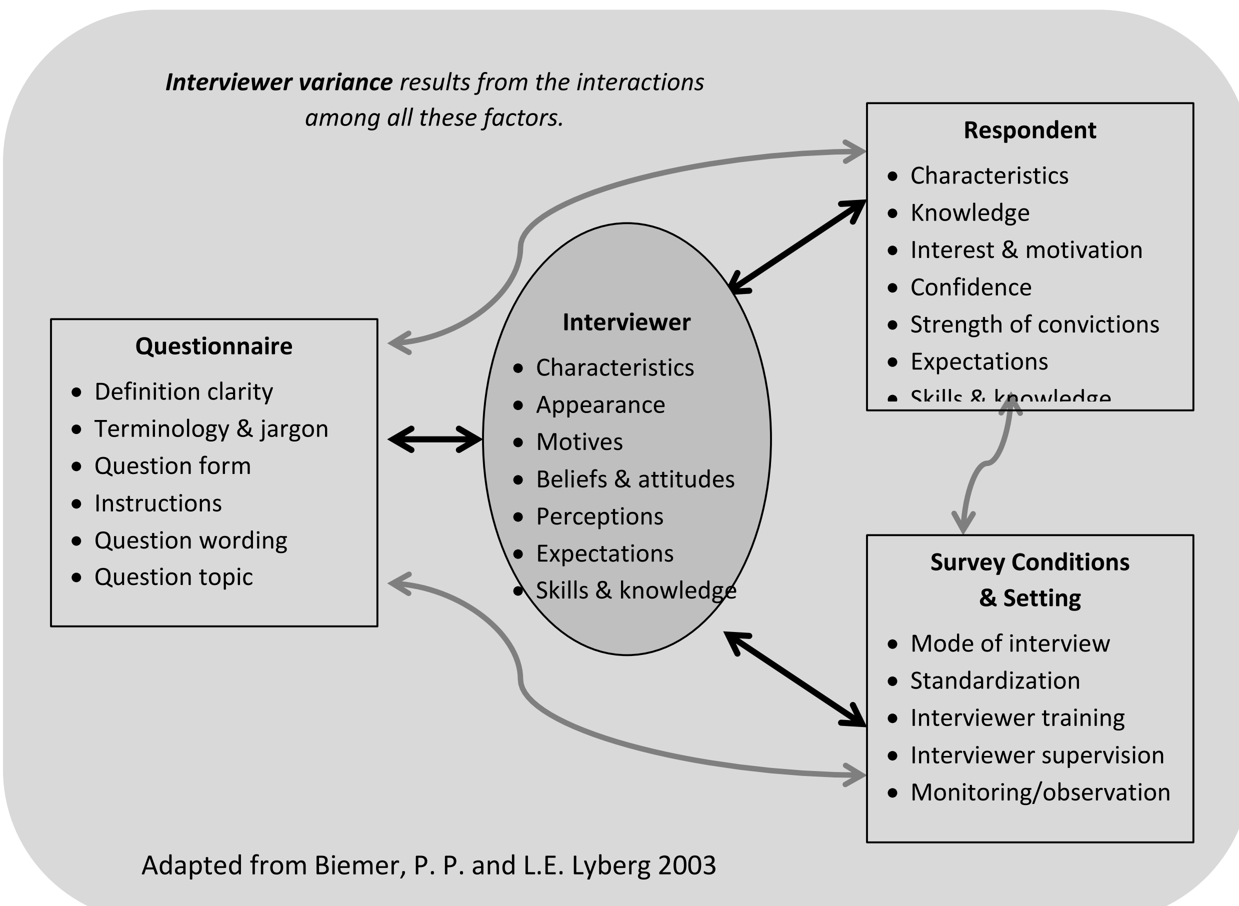
Selecting appropriate data sources

Data sources also are important. Evaluation data can be gathered from primary or secondary sources. Primary sources include original documents, the first reporting of facts, and the first grouping of the raw data collected either by the evaluator or obtained from some other source/method. Secondary sources are materials that combine and synthesize data from multiple primary sources. There is no one "best" method. Selecting appropriate data sources should be based on the relative merits of each source and influenced by the type of information desired, time availability, and resources available to conduct an evaluation. Data source selection also should consider population type and the nature of the issue to be evaluated. If original data is to be collected, the specific format or source should consider all the above plus question form and content, response rates desired and expected from a specific population, and temporal duration of the data collection process.

Carefully selecting, training, and monitoring data collectors

Surveys and personal interviews are popular forms of data collection for evaluating extension projects and programs. Evaluation projects generally utilize more than one person to collect data. Although many factors may affect data quality, minimizing interviewer variance is critical for acquiring valid and reliable data. In addition to potential diversity among the interviewers themselves, there exist a variety of factors reflecting interviewers' interactions with interviewees, the instrument, and the interview context that might affect data quality. Figure 2 identifies various interviewer characteristics, all elements that may affect their understanding of a questionnaire or guiding questions, and their interactions with both the context and interviewees that might affect the nature and quality of the data. As so many factors may affect variance in results attributed to interviewers, careful selection and training of interviewers can help ensure data quality and consistency. If possible, evaluators should identify and select data collectors at the time of finalizing data collection instruments and plans. They must understand the local culture and should have good reading and writing skills, good listening skills, and the ability to build rapport quickly. Trained interviewers having no special attachment to the project/program being evaluated often are the best choice.

Figure 2: Factors That Can Contribute to Interviewer Variance



Training of data collectors is essential prior to actual data collection. Training topics should include, as relevant to a specific evaluation, an introduction to the study, role of the interviewer, confidentiality procedures, review of the questionnaire and interview protocols, standardized interviewing techniques, probing, recording responses, gaining cooperation, and presentation of scenarios. Pre-testing or pilot-testing of instruments offers an opportunity for hands-on training for data collectors.

A common problem with using personal interviews as an evaluation technique is falsification of data. Falsified information may include fabrication of entire interviews, deliberate skipping of some questions, or fabrication of contextual factors and interviewee characteristics (socio-demographics). Incomplete surveys and inconsistent answers are common problems with personal interviews. Direct supervision, random verification with sample respondents, and close monitoring help minimize such problems. Frequent checking for completeness of information or data collected, timely adjustment of procedures or tools to fit changing conditions, and timely data entry into a computer database for safe-keeping and analysis contribute to the level of data quality for data analysis. Numerous electronic devices such as PDAs, smartphones, and tablet computers, in conjunction with electronic forms, increasingly are being used to collect survey data. In addition to the ease of using such devices, they can be "stamped" with geo-position data to facilitate geospatial analysis.

Selecting randomized and/or representative samples

Evaluation of extension programs and projects usually involves first-hand collection of data from people. Thus, the evaluator must make numerous decisions about the sample population then develop an appropriate sampling plan. The population is the total group from which samples are taken for statistical measurement. Rather than surveying every person in a given population (census), evaluators often survey or interview a sample of the population. Using samples is less costly in terms of time, money, materials, human resources, and effort than surveying or interviewing an entire population. Sample size and type depends on what is to be evaluated and whether the selected methodological approach is quantitative or qualitative. For quantitative methods, appropriate statistical analyses, combined with an appropriate sampling plan and a relatively high response rate, can provide accurate and precise results.

A good sample is a subset of the population that reflects the characteristics of, or is representative of, the target population (Fink, A. 1995). A sample is representative if important characteristics (e.g., age, educational level, ethnicity, income) are similarly distributed. A representative sample can be used to make estimates about the whole group. Sampling methods usually are categorized in two types: random (probability) sampling and purposeful (non-probability) sampling.

Selecting a sample using random (probability) sampling

Random, or probability, sampling is based on random selection of units from the identified population. This sampling method eliminates subjectivity in choosing a sample and provides a statistical basis for claiming that a sample is representative of the target population. Every member of the target population has a known probability of being included in the sample. Several types of random (probability) sampling techniques are available to evaluators (see Box 12).

Choosing an appropriate sample size requires consideration of numerous factors that influence it. As a general rule of thumb, Kerlinger and Lee (2000) suggest that researchers "use as large a sample as possible . . . the smaller the sample the larger the error, and the larger the sample the smaller the error" (p. 175). Nevertheless, the most relevant consideration is that the sample is representative of the target population. Factors to consider when determining sample size are listed in Box 13.

Box 12. Types of Random Sampling Strategies

Simple Random Sampling: All individuals in the population have an equal and independent chance of being selected as a member of the sample. Random samples can be drawn by using randomly generated lists with a computer, or by using a random numbers table.

Stratified Random Sampling: To ensure that certain population subgroups are represented in the sample in proportion to their numbers in the population, individuals within each subgroup, called a "stratum," are numbered separately, then a random sample is selected from each stratum. This strategy is more complicated than simple random sampling; using many subgroups, or "strata," can lead to a large, expensive sample. Therefore, clear rationale should exist for selecting any stratum.

Cluster Random Sampling: In this strategy, the sampling unit is not the individual, but rather a naturally occurring group of individuals, such as a classroom, neighborhood, village, club, or farmers' group. Clusters are selected randomly, with all members of the selected clusters included in the sample. Cluster sampling is used in large-scale evaluations.

Box 13. Factors to Consider in Determining Sample Size

Characteristics of Population: Sample size must consider the amount of variability in the population to be sampled. A relatively homogeneous population may permit a relatively small sample size; conversely, a more heterogeneous one may require a larger population size.

Sampling Error: The difference between an estimate taken from the population and that taken from the sample when the same method is used to gather the data is called the sampling error. It is larger when the sample size is small. Therefore, it is advisable to use the largest sample size possible, given constraints of time, money, human resources, and materials.

Confidence Interval: Confidence intervals are used to specify the range in which an estimated effect is expected to lie. It relates to how sample results are used to make statements about the overall population. Confidence intervals often are used to demonstrate reliability of an estimate. A common rule of thumb is that a 95% confidence interval is adequate.

Type I Error: Type I error is made when an effect is shown where one does not exist (similar to a false positive in pregnancy testing). Potential for Type I error is reduced with larger sample sizes.

Type II Error: Type II error is made when results show no impact of a program when, in fact, an impact has occurred. Type II error is reduced with larger sample sizes.

Minimum Detectable Effect Size (MDES): MDES is the smallest true program effect that can be detected for a given "power" and "level of significance." The smaller the effect size we want to detect, the larger a sample size we need for a given power.

Cluster sampling is ideal for impact evaluation of large-scale agricultural extension projects using experimental or quasi-experimental designs. Bloom (2005) asserts that it is extremely important to randomize an adequate number of clusters and far less important how many individuals per group are sampled. Jin and Maredia (2011) developed a table to show sample sizes, using cluster sampling, resulting in a range of minimum detectable effect sizes for a two-tailed hypothesis test, assuming equal variances without covariates and a power level of (1-β) = 0.8, a significance level of (α)=0.05, an interclass correlation of (ρ) = 0.10, and the number of clusters being 60% for treatment and 40% for control groups (or P=0.6). Table 3 displays the required group size (n) for a given number of clusters.

The key message illustrated in Table 3 is that it is important to have enough clusters from which to collect the data to achieve the desired minimum detectable effect (MDE). For example, if each cluster has 30 individuals or households, it would take 50 clusters to achieve a MDE of .29 (shaded gray, with red numbers). In another example, if the evaluator wants to achieve a MDE of 0.40 (shaded yellow), they could select either 40 clusters of 10 individuals/households each (n= 400) or 30 clusters of 20 individuals/households each (n= 600). The gain in ability to detect MDE is much greater from increasing the number of clusters (J) than increasing the number of individuals (n) in each cluster (Bloom, H.S. 2007).

Table 3. Truncated Table Showing Minimum Detectable Effect Size as a Function of Number of Clusters and Sample Size per Cluster

	Randomized Group Size (n)											
# of Clusters (J)	**Multi-plier**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**60**	**70**
5	4.10	1.60	1.47	1.40	1.35	1.32	1.30	1.28	1.27	1.26	1.24	1.23
10	3.20	0.88	0.81	0.77	0.75	0.73	0.72	0.71	0.70	0.70	0.69	0.68
20	2.96	0.58	0.53	0.50	0.49	0.48	0.47	0.46	0.46	0.45	0.45	0.44
30	2.90	0.46	0.42	**0.40**	0.39	0.38	0.38	0.37	0.37	0.36	0.36	0.36
40	2.87	**0.40**	0.36	0.35	0.34	0.33	0.32	0.32	0.31	0.31	0.31	0.30
50	2.85	0.35	0.32	0.31	0.30	**0.29**	0.29	0.28	0.28	0.28	0.27	0.27
60	2.82	0.32	0.30	0.28	0.27	0.27	0.26	0.26	0.26	0.26	0.25	0.25
70	2.80	0.30	0.27	0.26	0.25	0.25	0.24	0.24	0.24	0.23	0.23	0.23

Adapted from: Jin and Maredia 2011

Appropriately analyzing data

Sound design and sampling are necessary, but not sufficient, to ensure a quality evaluation. Appropriate and robust statistical analysis is critical to credible results. Choice of analytical technique depends, in part, on whether the data are quantitative or qualitative. But rigor is an essential characteristic for both.

Quantitative analysis

Evaluation data usually are collected in the form of numbers. Quantitative data help determine relationships or differences between variables. There is a relationship between variables when knowledge of one property (characteristic) of a case reduces uncertainty about another property (characteristic) of the case. If results show a relationship between variables, it means that variables tend to "go together" in a systematic way.

Correlation statistics measure the relationship between two variables, often between a dependent variable and an independent variable (e.g., number of new production practices adopted and rice yield), and are reported within a range of +1 (perfect positive correlation) to -1 (perfect negative correlation). Positive relationships indicate that, as the value of x increases, the value of y increases. Negative relationships indicate that, as the value of x increases, the value of y decreases. A correlation coefficient value of 0 means there is no linear relationship between the variables.

Correlations are used with questions such as: Do farmers who attend extension workshops on a regular basis adopt more new practices than those who do not? Are female farmers more likely than male farmers to intend to adopt hybrid maize seed? It is important to note that correlations identify relationships between variables, but they do not establish causation. Table 4 provides a guide for common data analysis methods and statistical tests.

Table 4: Selection Guide for Common Statistical Methods

Scale of Measurement of Data	Statistical Method	Testing for: Differences (between groups)	Testing for: Relationships (within one group)
Categorical **Nominal** **Ordinal**	Non-parametric Test	Cross-tab or Chi-square	Contingency coefficient: • Phi coefficient • Cramer's statistic • Kendall Tau b *(square table)* • Kendall Tau c *(rectangular table)*
Nominal **Interval** **Ratio**	Parametric Test *(use random sample; assume data come from normally distributed population, and equality of variance)*	Independent variable should be categorical; dependent variable should be interval or ratio scale. • Use T-test for independent groups to compare means for 2 groups. • Use T-test for matched-pairs to compare pre/post (before/after) mean scores. • Use ANOVA to compare means of $\geq$3 groups.	• Use Pearson correlation to determine linear relationship between 2 variables measured at interval or ratio scale. • Use regression to determine relationship between two or more variables. • Use discriminant analysis if independent variable is measured at interval/ratio scale and dependent variable is dichotomous.

Adapted from: Suvedi, 2011

Advanced statistical tools and data analysis software are available to assist in determining impacts of extension programs on people, communities, or the environment. A practical concern with use of statistical tools is forgetting to test the assumptions of the tools, which must be met to permit use of the specific tools and to facilitate proper interpretation of results (Miller, L. E. 1998).

Qualitative analysis

Qualitative data are mainly narrative data that come in many forms and from a variety of sources. Sources include personal interviews, focus group interviews, key informant interviews, case studies, daily journals and diaries, documents, and testimonials or storytelling based on personal accounts of experience. Data collection primarily involves the use of participatory methods. Use of participatory methods enables inclusion in impact evaluations of voices of underrepresented groups – such as the poor, the landless, and women – often missed in other types of studies (Chambers, R. 2009).

Evaluators who specialize in qualitative analysis use a method called 'content analysis.' Content analysis is a systematic technique for analyzing the substance of a variety of documents, transcriptions, and open-ended survey comments. This process includes carefully reading the information, then identifying, coding, and categorizing the main themes, topics, and/or patterns in the information. Coding involves attaching some alphanumeric symbol to phrases, sentences, or strings of words that follow a similar theme or pattern. This process allows placing these themes into categories to draw meanings. Guidelines for facilitating qualitative data analysis are presented in Box 14.

Box 14. Guidelines for Qualitative Analysis

- Get to know your data. Read and re-read the text or listen to the tapes before you begin the analysis. Quality analysis depends on understanding the data and its context.
- Review each evaluation question (clarify the purpose of each). Focus on relevant program topics and criteria.
- Classify information into different themes or patterns, organizing them into coherent categories that summarize and bring meaning to the text.
- Identify themes, patterns, and connections within and between categories.
- Interpret the findings by using themes and connections to explain them.

Adapted from: Taylor-Powell, E., and M. Renner. (2003).

Communicating and utilizing evaluation findings

The most challenging task for evaluators is to develop useful results from the data and then to share the results with its users. Program administrators and managers have a responsibility to report evaluation findings to stakeholders and other audiences who may have an interest in the results. Additionally, it should be remembered that use of results is different from simply reporting and disseminating them (Patton, M.Q. 2008b). Use of findings means making thoughtful and deliberate decisions based on those results. Thus, communication with stakeholders should occur throughout the evaluation process to help ensure meaningful, acceptable, and useful results.

High quality evaluations should contribute to improvements in programs and policies. Evaluators who are committed to having their work used must ensure that their findings reach intended users in a timely manner. In fact, relatively new thinking in evaluation posits that the job of evaluation is not complete until the results are used. Evaluators should, in collaboration with stakeholders, deliberatively build in clear strategies for integrating evaluation *and* for using the results during the extension program planning process. In fact, Patton (2008a) advocates that evaluation itself be evaluated based on whether or not results are actually used to inform decisions, make changes in programs, reallocate funds and other resources, and propose policy. Such an approach is termed utilization-focused evaluation. Additionally, telling the truth to those who may not want to hear it is another purpose of evaluation.

Not all information, however, is useful to all stakeholders. Also, not all stakeholders are information users. Therefore, getting the right information to the right people at the right time is essential so that information intended for specific uses is likely to be successful. Evaluators must determine the most effective media formats and venues to reach specific stakeholder groups, and tailor the focus and depth of the reports to specific groups, as not all stakeholders prefer or use the same formats. For example, some prefer short oral presentations; others prefer written reports. Typically, using more than one method is needed to reach all the stakeholders and intended users. The most important thing is sharing evaluation findings in a timely manner with appropriate stakeholders (Patton, M.Q. 2008a). Varied media formats for sharing evaluation results are listed in Box 15.

Box 15. Formats and Venues for Reporting Evaluation Results	
Verbal reports	Audio-visuals
Media appearances	Journal or newspaper articles
Executive summaries (varied distribution)	News releases
Public meetings or workshops	Newsletters, bulletins, and brochures
Personal discussions	Poster presentations
Web pages (static and dynamic)	Evaluation reports
Radio broadcasts	Cell phone networks & apps
QR codes linked to information	Text messages

In a world that is constantly changing technologically, as illustrated with extensive diffusion of cell phone technology into many remote villages and to farmers globally, it is critical that extension systems and services continue to modify and expand their information dissemination systems. For example, extension managers might consider networking people (extension staff as well as in-field innovators) via online “Ask an Expert/Ask an Innovative Farmer” web sites. They might consider using texting, QR codes, or tailor-made real-time data-reporting “apps.” Some might opine that many of these new technologies provide messages that are too brief to be useful. However, these new “cryptic” messages can be used to link users to more comprehensive sources, or to link them directly to other people.

Sometimes an evaluator must report negative findings. For example, a program may not be meeting its objectives; a program is being mismanaged; or program changes are needed to increase effectiveness or efficiency. Evaluation can identify negative results as well as their potential causes or contributing factors. Thus, negative results can be just as important as positive results in making decisions. Reporting these difficulties can help avoid future mistakes and suggest ways to improve. However, negative findings must be reported in a manner that helps promote learning and improvement rather than engender feelings of failure.

Conclusions

As stated in the introduction of this chapter, agricultural extension is changing rapidly. The conventional top-down, supply-driven extension system no longer appears to be an appropriate model. Some countries have been promoting decentralized and/or bottom-up extension systems; others are considering market-driven or fee-for-service systems. Non-governmental organizations are extending education and training services to farmers and agribusinesses. In most countries, central governments provide an overall policy framework for extension, but a variety of actors (public organizations, civil societies, and private firms) provide a range of services to farmers and agribusiness operators. A more recently proposed model is one in which extension staff work more collaboratively with those who have been viewed traditionally as “clients,” thus more clearly becoming partners in issue identification, action selection, solution finding, and program planning. Regardless of the extension model in place, demand for accountability has increased, partly due to increased competition for resources among agencies and organizations. High quality, integrated evaluation helps address issues of accountability.

In traditional as well as evolving extension systems, employees continue to be highly valuable assets. The quality of their educational programs depends heavily upon the professional roles played by extension educators, as educators, trainers, and partners. To perform their roles effectively, all extension educators should possess sound technical knowledge and skills in the subject matter with which they work. These technical skills and competencies are necessary, but not sufficient, for extension educators to serve effectively. Because we live in an era of accountability, funding agencies demand to know about impacts of extension work. Knowledge and skills in applied research and evaluation can help respond to these demands and, thus, should be recognized as core competencies for all extension educators. To summarize, every extension educator should be able to:

- understand the different types and levels of program evaluation;
- develop outcomes and indicators to evaluate a program;
- design evaluation instruments and understand the uses of participatory evaluation;
- design and implement formative, summative, and impact evaluations;
- apply quantitative and qualitative data analysis tools and techniques, as appropriate, to analyze and interpret evaluation data;
- communicate findings to appropriate audiences; and
- use results of evaluation to improve programming.

Sound program evaluation requires a fairly good knowledge of research methods, measurement, data collection and analysis, and interpretation of results. Most front-line educators lack adequate knowledge and skills in planning and conducting agricultural extension program evaluations (Radhakrishna, R. and M. Martin 1999; Suvedi 2011). Thus, investment in agricultural extension must consider investment in human capacity building through in-service/on-the-job training and pre-service professional education. Immediate investments are needed to upgrade the current monitoring and reporting systems, strengthen applied research and evaluation skills of mid-level managers and trainers who supervise the work of front-line educators, and build reward systems that recognize work on impact evaluation to keep the extension system dynamic, effective, and valued. Suggestions for addressing these challenges include establishing vibrant staff development programs, motivating staff to engage in program evaluation work, mentoring those willing to include evaluation in their programs, and incentivizing those who gain evaluation skills through training and subsequent inclusion of evaluation in their programs. Ultimately, in-service and pre-service training programs are the building blocks for local capacity building.

Perhaps a strong building block toward designing and implementing relevant evaluation programs would be implementation of basic monitoring programs that would provide baseline data for subsequent evaluation, provide obvious and direct benefits to the farmers themselves, and accustom farmers to regular use of technology to provide these benefits. A current example of an innovative monitoring system, developed by Catholic Relief Services (CRS) with funding by MEAS and in response to diverse members of the Agriculture Learning Alliance (ALA), is Farmbook, a field-based, technology-facilitated system that enables farmers, working with field agents, to plan their farm businesses based on monitoring their productivity and profitability. Using PDAs, smartphones, or tablet computers, farmers can input relevant data into pre-designed forms using one of several software packages (e.g., iForm-Maker, Form Maker Pro, Form2Go, Wufoo, Formstack), some of them available free of charge via the Internet. With some software, geo-positions can be auto-stamped to the data, facilitating geographic analysis and data mapping. Farmers can record things such as inputs, yields, weather conditions, labor patterns and costs, and sales. Advantages of using such technology include providing real-time access by farmers to information such as market prices, loan rates, and weather predictions to help them make wise farm management decisions, and to access supplemental training information on demand.

Farmer engagement and empowerment are direct advantages of these monitoring and training systems. Evaluators also can benefit from farmers' adoption and use of these technologies. Ultimately, data collected regularly through such methods can be used as baseline data for comparative evaluations as well as used as partial sources for other types of evaluation. Farmers who have become familiar and comfortable with using technology increasingly will be able to respond effectively and in a timely manner to technology-based surveys and other evaluation tools.

Additionally, because program evaluation expertise tends to originate from international aid agencies and organizations, there is a need to develop evaluation capacity at the national level in many countries. Extension organizations should identify and train staff to serve as national leaders for program evaluation. International aid agencies may contribute to the development of a network of evaluators so evaluation practitioners can share empirical studies to benefit each other. Building national in-country and local capacity is a major step toward sustainability of extension services.

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