

WORKING PAPER NO. 12⁵⁶⁹⁷⁹

**THE LOGICAL FRAMEWORK
IN
RESEARCH PLANNING AND EVALUATION**

ISNAR

International Service for National Agricultural Research

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ISNAR WORKING PAPERS

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2. They are intended to be an effective vehicle for widening the discussion of continuing work, thereby increasing the quality of the final products. Critical comment is welcomed.
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THE LOGICAL FRAMEWORK IN RESEARCH PLANNING AND EVALUATION

Research management concerns many people: policymakers, national research leaders, development organizations, program chiefs, station managers, and researchers. In order to make the most of the resources available to research, managers must be aware of the research priorities defined by policymakers and national leaders, the agricultural constraints and technical opportunities for research, and the capabilities of researchers. Research managers must formulate programs which have the best likelihood of fulfilling national research objectives, taking into account the perceived needs of farmers and the technical and resource constraints which exist. This is a complex task, which requires the consideration of many things, including:

1. the relationship of programs to national research objectives;
2. the determination of programs, whether based on commodities, regions, factors, or disciplines;
3. the allocation of resources among programs, based upon opportunities for success and potential impact;
4. the determination of projects within programs from among the many alternatives possible, bearing in mind the importance of staff capability, institute resources, complementarity with other projects, and the likelihood of results which justify the investment.

In this working paper, we describe a framework for conceptualizing research projects and programs, called the Logical Framework (Figure 1). The Logical Framework is simply a tool which provides a structure for specifying the components of an activity and the logical linkages between a set of means and a set of ends. It places the project in its larger framework of objectives, within the program and within the national research system. It serves as a useful tool for defining inputs, time tables, assumptions for success, outputs, and indicators for monitoring and evaluating performance. Learning to use the Logical Framework requires some concentrated effort, and it is often offered in management training courses. It is not an essential technique but it is a highly effective planning tool. Whether or not this technique is used, the basic information it provides is essential to adequate planning, and so an introduction to the Framework is useful.

This ISNAR working paper is one of several which describe useful project planning and management techniques. Subsequent working papers will cover the development of project proposals and workplans, project management techniques useful in performance monitoring, such as checklists, bar charts, and the more complex critical path network, and monitoring and evaluation. The author has attempted to be as succinct as possible in this paper, realizing that researchers and research managers are busy people who need practical management techniques. These techniques are aimed to improve your research, not to make research management an end in itself.

Figure 1

A LOGICAL FRAMEWORK MATRIX

<i>Narrative Summary</i>	<i>Objectively Verifiable Indicators (OVI)</i>	<i>Means of Verification (MOV)</i>	<i>Important Assumptions</i>
Inputs	Nature and level of resources Necessary cost Planned starting date	Sources of information	Initial assumptions about the project
Outputs	Magnitudes of outputs Planned completion date	Sources of information Methods used	Assumptions affecting the Inputs-Outputs linkage
Purpose	End of project status	Sources of information Methods used	Assumptions affecting the Output-Purpose linkage
Goal	Measures of goal achievement	Sources of information Methods used	Assumptions affecting the Purpose-Goal linkage

Before beginning a discussion of the Logical Framework, it is necessary to define the terms "program" and "project", since they have different meanings in different research organizations. Programs are coordinated research activities whose combined scientific outputs address national research objectives. Programs are long-term and somewhat continuous, and are composed, in some cases, of sub-programs, and of projects. Projects address specific research problems, and have explicitly defined time frames, resources, and targets. Each project in turn comprises a number of specific operations or experiments.

The Logical Framework, or "logframe", can be used at any level of planning and decision making, from the development of programs to experiments. It is most aptly used by small groups, as a framework for brainstorming and discussion. The program logframe is best completed by compiling more specific, detailed logframes for each individual project under the program; these in turn are based on step by step work plans for each operation. These programming documents help to define the key indicators used in monitoring and evaluation, and provide the framework for progress reporting.

The information required both to design and evaluate an activity can be summarized on its four by four matrix: the rows represent different levels of project objectives, including the means required to achieve them (the vertical logic); the columns indicate how the achievement of these objectives can be verified and the assumptions that were made (the horizontal logic). Table 1 indicates what type of information would be included in the analysis of a research program with various component projects. Using this as a guideline should make supplying specific information easier.

THE VERTICAL LOGIC

From the bottom to the top in the left column is a "narrative summary" of the four levels of objectives of a program, including the inputs, outputs, purposes and goals. It should provide a clear, concise statement of project objectives, and indicate the plausibility of the assumed linkages between levels.

Inputs comprise the personnel, physical resources and financial elements needed to achieve the stated outputs. These typically include manpower, infrastructure, equipment, supplies, support services, and funds. The specific requirements are defined from the development of an operation workplan. In research activities it is also valid to include leadership and a defined set of research objectives as inputs.

Outputs include those achievements derived directly from the management of inputs. For example, a maize breeding project within the maize program with sufficient manpower, facilities and support (inputs) would be expected to identify or develop within an estimated time frame new germplasm with certain desired characteristics (outputs).

The Purpose is what the project is expected to achieve once completed. The purpose is generally defined as the research objectives of a given project. In the example of a breeding program, it is assumed that if a variety is identified with the desired characteristics (output), then producers will adopt it and production will increase (purpose achieved).

Table 1: Logical Framework: Research Programs

	Narrative Summary	Verifiable indicators	Means of verification	Important assumptions
If	<u>INPUT - by projects according to operation workplans</u>			
	Human resources Funding Facilities Equipment and supplies Training Scientific leadership	Staff and facilities in place by end year 1 Courses completed Senior:junior staff 1:5	Quarterly and annual reports Accounting and administrative records Training records Personnel data	Funds & staff approved will be disbursed and available Courses available Time & means for staff supervision
If Then	<u>OUTPUT: Program objectives - compiled for all projects</u>			
	Preliminary research results Completed research results Research capacity strengthened	Data from surveys/ experiments Recommendations by program comm. Improved staff & facilities	Research reports Program records Annual reports Admin. records Peer review	Scientific standards upheld Procedures exist for release
If Then	<u>PURPOSE: Research system objectives - compiled for all programs</u>			
	New knowledge exists of interest to research, extension, and policymakers	Released technologies or recommendations	Program records Certification Res/extension Communications on policy	Inputs available Prices favorable Extension services Seed mult capacity
	<u>GOAL: National development objectives</u>			
	New technology contributes to national development objectives	Production data Changes in crop patterns/inputs Reduced erosion Increased incomes	Farm surveys Input statistics Survey methods Village surveys	Positive economic environment Stability Adequate roads, markets, etc.

The Goal is the ultimate objective for undertaking the research project. In the broad context of national development it is usually a desired economic achievement for which the attainment of research project or program objectives are necessary but not always sufficient. Here, using the maize program example, the expectation is that if better maize technology is available (output) more maize will be produced (purpose), thereby contributing to a national goal of food self-sufficiency. It should be evident that increased maize production alone is not sufficient to ensure national food self-sufficiency.

There is a direct cause and effect relationship presumed between input, output, and purpose. This cause-and-effect linkage can be expressed in terms of an IF-----THEN relationship.

IF inputs are provided THEN outputs will be produced.

IF outputs are produced THEN the purpose will be achieved.

The relationship between purpose and goal is less direct and causal, since many exogenous factors may influence goal attainment. In this case, achieving the project purpose is considered necessary but not sufficient for achieving the goal.

IF the purpose is achieved THEN the goal may be achieved if other causal factors are also met.

At the input-output-purpose levels the research manager has much influence over the attainment of objectives. At all levels, the assumptions listed should indicate the necessary conditions for achieving the planned objectives. Evaluators should be able to articulate clearly the cause-effect relationship which was presumed when a given objective was assigned to research. Figure 2 is an example of a Logical Framework used to describe a specific research activity.

THE HORIZONTAL LOGIC

The second column, Verifiable Indicators, specifies the type of evidence needed to verify the achievement of objectives at each level, and the third column, Means of Verification, indicates how that evidence can be found and measured. Both have consequences for monitoring and evaluation:

- they define the data collection and reporting requirements during the implementation of the activity (monitoring), and
- they define from the outset of an activity the standard against which actual results will be measured (evaluation).

Indicators and their means of verification must be carefully selected. Because there are costs associated with collecting and analyzing data, indicators should be kept to a minimum. They should:

- clearly indicate the criteria for attaining objectives;
- specify the nature, quantity, quality, and time required for the objective to be achieved;

Figure 2

LOGICAL FRAMEWORK

NARRATIVE SUMMARY	VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
INPUT Maize breeder Maize agronomist Weed scientist Support Staff Germplasm Facilities Funds	Staff and facilities in place by end of year 1	Quarterly and annual report Accounts and administrative reports	<ul style="list-style-type: none"> - annual funding available on time and in accordance with budget - varieties available from IITA
OUTPUT <ul style="list-style-type: none"> - Maize varieties identified resistant to Striga - Striga-specific herbicides identified - Cultural techniques identified to suppress Striga infestation 	Year 3: <ul style="list-style-type: none"> - 2 hybrid, 2 composite & 4 open varieties identified - 3 Striga antagonist crops identified - cultural practices to suppress Striga identified - Striga herbicides identified and rated 	<ul style="list-style-type: none"> - Experts records - On-farm test - Research reports 	<ul style="list-style-type: none"> - close liaison extension service for on-farm testing
PURPOSE To increase production of maize	By Year 6: <ul style="list-style-type: none"> - production of maize increased 40% in Striga areas - associated bean production increased 20% 	<ul style="list-style-type: none"> - market & production statistics - farm surveys - extension reports 	<ul style="list-style-type: none"> - fertilizers, herbicides, farm credit available - demand for maize continues to give incentive to producers
GOAL To increase cash income of rural producers	Changes in patterns of expenditure	Farms & village surveys	Policy continues to support maize marketing

- be of an appropriate scale, and focus on key processes;
- be sufficient in number and detail to adequately measure achievement of objectives;
- be independent of the biases of evaluators;
- be objectively verifiable and unambiguous.

Indicators for the inputs to a program are easy to determine, since they can be expressed in term of resources or activities, such as personnel time, supplies used, courses attended, or funds expended. The inputs at this stage are usually specified, and can be measured or assessed; verifying that implementation is proceeding as planned requires tracking actual inputs against proposed inputs, in a given time frame, for instance by keeping logs of staff time and activities undertaken. Monitoring program leadership and sound programming procedures is more difficult and must be dealt with in more qualitative ways, such as through peer review and standard reporting.

When selecting indicators of the outputs level, it is helpful to think of the expected output and purpose of the activity in term of targets, answering the questions of what, how many, with which characteristics, when. If one of a program's expected outputs is a new variety of maize which permits double cropping and higher yields, then an appropriate indicator might be the certification of a variety by year 7, which has a 90-day cycle, and which yields more than 2 tons/ha under farm conditions. The means of verification in this case would be records from experimental trials, results of on-farm testing and verification, and records from the varietal certification boards.

At the input-output-purpose levels of inquiry, documents of program planning meetings, quarterly and annual research reports, research proposals, survey results, and scientific publications can be used to evaluate research program execution. In an ideal system these reports would have been routinely gathered and monitored by researchers and management to identify implementation problems. Table 2 summarizes some of the indicators suitable for research program M/E and their means of verification. This table is by no means exhaustive; it is suggested as a list which may guide research managers in defining an appropriate list for their systems.

The last column, Important Assumptions, lists those factors which are not controlled by the project but which influence its implementation and chances for success. For example, fixed national commodity prices could influence the purpose to goal relationship by making maize production unattractive, even if better technology were available. Assumptions at this level are often difficult to influence, but they should be defined in advance and monitored.

The assumptions column is meant to keep decision makers realistic in their expectations; if a situation looks particularly hopeless, these leaders should reorient their research programs to take this into account. Sometimes, where national policies are concerned, research managers can be successfully involved in policy dialogue to ensure that

Table 2: Examples of Research Program Indicators

Levels of achievement	Possible indicator	Means of verification	Responsibility for data collection
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INPUTS - Determined by projects, based on operation workplans:

- personnel	scientific and support time	time sheets	individual reports
- funding	expenditures	accounting data	accounting office
- facilities	construction or acquisition	on-site report	institute engineer
- equipment & supplies	actual use	procurement data	accounting office
- leadership	project meetings	lab/station logs	lab/station manager
- training	program meetings	meeting reports	project head
	courses completed	meeting reports	program head
		training records	training officer

OUTPUTS - Considered both by projects and by programs:

- preliminary research results	research data from experiments	research reports and surveys	scientist
- completed research results	program committee recommendations	publications	project head
- research capacity improved	program committee recommendations	program records and annual reports	program head
	trained personnel & improved facilities	training records	NARS director
		administration records	training officer
			administrator

PURPOSE - Contribution of knowledge from research programs to research, development and policy making bodies:

- new knowledge of interest to research, extension & policymakers	released technology or recommendations	program records certification res/extension communications on policy	program head
			national body
			extension service
			NARS director

GOAL - Research relationship to national development objectives:

- increased crop production	production data	farm surveys	statistics dept.
- intensified land use	changes in crop patterns & inputs	input statistics	devel. ministry
- conservation & land use	reduced erosion	survey methods	land use body
- increased income	resource planning	planning document	planning body
- improved nutrition	per capita change	national data	statistics dept.
	increased spending	village surveys	devel. ministry
	decreased disease & mortality	nutrition surveys	national health service

an assumption comes to pass. Assumptions are particularly important for research managers at the input and output levels, where the list of assumptions serves as a red flag to management that they must actively monitor and assure that the conditions listed are achieved.

While research managers are primarily interested in input, output and purpose level information, ex ante and impact evaluations are concerned with the relationship of research programs to larger development objectives, and so the entire framework is useful. The primary purpose for conducting any analysis at this level is to squarely understand the expectations placed upon the national research system, the validity of these expectations, and whether the research programs planned and operating in country are logical responses to these expectations.

Figure 3 indicates how the Logical Framework matrix can be used specifically as a monitoring and evaluation tool. The targets against which performance is measured is found in the Verifiable Indicators column. The actual data monitored are in the Means of Verification column for each level of the management hierarchy. The assumptions are usually better defined and more "manageable" at the inputs and outputs levels than at the purpose and goal levels, and can, therefore, be more easily monitored and evaluated.

Project evaluators are primarily interested in the targets set and the assumptions made at the input and output levels. Project performance (efficiency) is the primary focus though the quality and relevance of the research may also be reviewed. Comprehensive program evaluations are concerned with program strategies and the achievement of program objectives, and are therefore more interested in purpose level achievements. Project complementarity within the program is also considered.

Impact evaluations, or the effect research has on national development objectives, are most concerned with those indicators monitored at the goal level. These are usually socioeconomic in nature, more expensive to collect, and analyzed 10-15 years after the technology from research has been released.

In summary, the Logical Framework is an effective tool for research managers for both the planning and evaluation of research. By following a logframe approach, managers are apt to more thoroughly consider the resources needed, the time frame of the research, the expected targets, and the conditions assumed necessary for the research to be successful. In addition, the Logical Framework places the research project in a larger framework of program and national research objectives, thus increasing the likelihood that research projects will be complementary within programs, and that they will address important, defined national research objectives.

Figure 3

LOGICAL FRAMEWORK

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
INPUT	Specified time-frame & resources	Data to be collected	Assumptions to be monitored/managed
<u>OUTPUT</u> Project Evaluation Project efficiency & effectiveness	Targets (annual & final)	Data to be collected managed	Assumptions to monitored/
<u>PURPOSE</u> Comprehensive Program Evaluation Program strategy & achievement of objectives	Targets (3-10 years)	Data to be collected	Assumptions to be monitored/managed Consider project complementarity
<u>GOAL</u> Impact Evaluation Contribution to Development Goals	Targets	Data to be collected	Non-research factors affecting impact

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