ICAR Manual

on

Priority Setting, Monitoring and Evaluation

National Academy of Agricultural Research Management (NAARM), Hyderabad

International Food Policy Research Institute (IFPRI), Delhi Office

National Academy of Agricultural Sciences (NAAS), New Delhi

Contents

Preface

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1. Introduction

1.1 Background

The ICAR constitutes one of the two major arms of the National Agricultural Research System (NARS). Through a vast network of Research Institutions, numbering about 100 along with several Research Stations working under them, distributed in different parts of the country undertake Basic and Strategic Research as well as Applied and Adoptive Research on problems of national importance. Scientists working in these institutions strive to identify problems faced by a wide variety of stakeholders associated with agricultural development by interacting with them and come out with appropriate solutions by undertaking research in their respective areas of specialization. In order to bring about synergy and at the same time avoid duplication of research efforts, the scientists are encouraged to plan and implement multidisciplinary, interdisciplinary and inter-institutional research projects. Though majority of the projects undertaken by the scientists are funded by ICAR, there is an increasing trend in the number of projects being supported by various agencies, both national and international, to solve emerging problems of national and global significance. In recent years, the ICAR promotes in a big way of conducting research in public-private partnership (PPP) mode.

In order for the research projects to be efficient and effective, a proper institutional mechanism becomes necessary to: i) select relevant projects with specific objectives based on priority, national or institutional, among the competing ones; iii) closely monitor their progress as planned and take mid-course corrections to overcome the constraints identified, if any; iii) and finally evaluate the achievements in relation to the objectives set at the beginning. Over the years, the ICAR has evolved a variety of ways and means to meet this requirement. On the basis of past experience and very useful suggestions provided by high-level Committees, an attempt has been made in this Manual to describe a user-friendly procedure to select projects in accordance with priority, periodically monitor their progress and finally evaluate their achievements by utilizing relevant parameters/indicators.

1.2 Project Management Cycle

Project management refers to a framework for systematic planning, implementation, monitoring, and evaluation of research projects. Project management follows a series of steps that constitute the ‘Project Cycle’, as under:

1.2.1 Identification of Priority Areas

It requires that there is a demand / felt need for the outputs and the availability of resources to produce them. The three ways by which the problems for research can be identified are: i) *National priorities* (ICAR Vision Document) and *Institute priorities* (Institute Vision, QRT, EFC and RAC Documents) that are broadly identified and accepted/approved; ii) *Pre-project/ Scoping/ Desk Study* to have a feel of the problems/constraints and their relative importance; and iii) *Participatory Rural Appraisal* (PRA) - This will help to link the scientists with end users for identification of real world problems faced by the latter, research results already available and the gaps in research which need further research. After the problems along with research gaps are identified, they need to be prioritized keeping in view the resources at the disposal of scientists/Institutes.

1.2.2 Preparation of Proposals

Once the priority areas are identified, they need to be developed into project proposals by paying attention to: i) *Title* - Clear, concise and self-explanatory; ii) *Justification/ Rationale* - Need for the project after identification of research gap through review; iii) *Objectives* - Specific, Measurable, Achievable, Realistic, and Time-bound; iv) *Organization/ Governance* - Various individuals/units associated with implementation; v) *Strategies and Methods* - Plan of action including the methodology, tools and techniques; vi) *Schedule of Activities* - With specified time frame to be included for monitoring the progress against time and targets; vii) *Resources Required* - Manpower, facilities, equipment, services, *etc.;* viii) *Budget* - Head-wise, both recurring and non-recurring; ix) *Objectively verifiable indicators* - Indicated for monitoring and evaluation: and x) *Expected Outputs* - Various forms to be specified in measurable terms.

1.2.3 Reviews and Reformulation of Proposals

The developed proposals need to be reviewed in terms of relevance, feasibility and scientific quality. This could be achieved by inviting suggestions for improvement from experts in the focus area of the project, either through written communication or e-consultation within a reasonable time frame. If necessary, the required modifications have to be undertaken to improve the quality of proposals.

1.2.4 Approval of Proposals and Allocation of Resources

The appraisal of proposals formulated by the scientists will be done by the competent authority more objectively based on specifically identified criteria such as Relevance of research, Addressing the Institute and/or National priority, Rationale /

Justification on the basis of research gap identified, Innovativeness expected, Appropriateness of design or techniques included, Elements of bias addressed, Adequacy of scientists' time allocation to various activities, Effectiveness of scientists' control over the experiments, Economic evaluation and cost effectiveness, and Appropriateness of the expected output answers the questions being addressed. Whichever projects satisfy these criteria to the maximum extent, they are approved and the required resources are allocated for implementation.

1.2.5 Implementation and Monitoring of Research

Various activities included under the approved project proposals are then implemented with the resources provided. The progress (both technical and physical) needs to be assessed periodically through proper monitoring by reviewing the achievements against the monitorable targets set. A sound monitoring system is required for efficient management of research projects.

- ***Purpose of monitoring:*** i) Collection of information that will enable ongoing decision-making regarding activities and progress, as well as decide on the mid-course corrections to be taken to overcome the constraints, if any, identified during monitoring; and ii) Documentation of input use and activities carried out for accountability requirements.
- ***Instruments used for monitoring:*** i) Progress reports (for technical and physical progress); ii) Internal reviews by the competent authority in the Institute; and iii) External reviews, wherever required.
- ***Components of monitoring:*** i) Collections of relevant information; ii) Processing and analysis of collected information; iii) Decision-making based on information collected; and iv) Action plan development.
- ***Users of monitoring:*** i) Researchers (project team); ii) Project leaders; iii) Research Managers; and iv) Funding agencies.

1.2.6 Evaluation of Results and Impacts

It basically refers to appraising or determining the worth, value, or quality of research in terms of its relevance, effectiveness, efficiency and impact.

- ***Principles of evaluation:*** i) It will be more effective if adequate monitoring, recording, and information mechanisms are in place and faithfully implemented during the course of the project; ii) It has to situate the activity in the institutional, social and economic context in which it is carried out; and iii) It must clearly bring

out the extent of achievement of research objectives set at the beginning and the actual contribution of these results to broader development objectives.

- ***Types of evaluation:*** i) Ongoing evaluation during the course of project implementation after the achievement of a particular objective; and iii) Final evaluation after the completion of the project.
- ***Methods followed should be:*** i) Valid – Sound and correct; ii) Credible – High quality and acceptable; and iii) Feasible – Implementable and easy to understand.
- ***Uses of evaluation:*** i) Use of results for public accountability; and ii) Use of results to improve management and decision-making by research managers in the Institute.
- ***Focus of evaluation:*** i) Relevance of objectives set; ii) Achievement of objectives (project effectiveness); iii) Appropriateness of the design and methods followed (project efficiency); iv) Contribution to the overall knowledge in research area; v) Adoption and use of information and technology generated; vi) Lessons learned from the project, and vii) Recommendations for future research.

1.3 PME Cells

Prior to the implementation of the World Bank supported National Agricultural Technology Project (NATP), Directors of Institutes were assisted by Technical Cells in managing their respective Institute research activities. Either the Scientists or the Technical Staff were made In-charge of these Cells. In order to make these Cells more competent to provide necessary technical support towards making the Priority Setting, Monitoring and Evaluation (PME) functions more effective, an idea was mooted to create PME Cells equipped with Scientists having technical expertise and PME skills in the ICAR Institutes. As a result, more than 30 such PME Cells were piloted in both ICAR Institutes and State Agricultural Universities (SAUs) with NATP funding. While Social Scientists (SS) were made In-charge of these Cells in some Institutes, others were headed by Biological Scientists (BS). With a view to developing necessary skills in managing the PME Cells more effectively, many training programmes and workshops were organized for the In-charge of these Cells. Since the entire process could not fully institutionalized and integrated with the decision making process, many of these Cells became ineffective after the NATP was over.

Realizing the importance of PME Cells and the critical role they could play in facilitating effective management of research projects in the NARS, greater emphasis was again made in the National Agricultural Innovation Project (NAIP) implemented with World Bank support during 2006-14. Under the NAIP supported VPAGe project, 14 PME Cells

which functioned fairly well under NATP were supported in a few selected ICAR Institutes and SAUs and concerted efforts were made to institutionalize them in the NARS. Simultaneously, a high-level Committee under the Chairmanship of Prof. S.L.Mehta was constituted by NAIP in 2010 to examine the status of PME Cells established under NAIP and to suggest measures to integrate and mainstream. The Committee has made very useful recommendations towards integration and institutionalization of PME in the NARS.

The ICAR has subsequently made it mandatory for the Institutes to create PME Cells (vide ICAR letter no. 30(8)/2010/PME Cells/NAIP/O&M) and transfer all the activities of Technical Cells to them. One Principal Scientist is to be made In-charge of the PME Cells and he/she has to be assisted by one to three Technical Officers (depending on the Institute size). In addition, ICAR has also taken a conscious decision to institutionalize the PME Cell concept in the SAU System by providing necessary technical and funding support. Once these PME Cells are institutionalized, the project management functions are expected to become more efficient and effective in the NARS.

1.4 PME Mechanism

In the ICAR System, the mechanism for Priority Setting, Monitoring and Evaluation (PME) has evolved over years of experimentation and experience.

While the ICAR has its Vision documents beginning with 8th Five Year Plan indicating the research priorities at the national level, each Institute has developed individual Vision documents orienting its activities and mandate in tune with the ICAR Vision. Keeping in view the Vision and mandate of the Institute they serve, as well as the ICAR Vision, the scientists develop project proposals based on the information collected through: i) field visits and interaction with various stakeholders to identify the problems and research gaps; and ii) literature search to understand the existing research gap. The proposals are submitted to the PME Cell in their Institutes, and they are critically examined in terms of their relevance, scientific merit and feasibility by the Project Monitoring and Evaluation Committee (PMC) chaired by the Institute Director and all the Heads of Division acting as Members (vide ICAR letter no. 30(8)/2010/PME Cells/NAIP/O&M). In large Institutes, they are discussed at the Division level before submitted to the PME Cell. While the PME Cell in the Institute acts like a 'Facilitation Unit' (not to be considered as a 'Policing Unit'), the PMC is the actual decision making body in the Institute.

After thorough discussion by the PMC the proposals with recommendations of PMC are submitted to the Institute Research Council (IRC) chaired by the Institute Director. The

proposals along with IRC recommendations are then critically examined and the projects are prioritized based on certain criteria and approved for implementation. Although the IRC is an internal body, some Institutes also invite external experts to facilitate more objective selection process. During implementation of the selected projects, their progress in terms of technical and physical achievements are periodically monitored by the PMC by involving one external expert and mid-course corrections are made on the basis of genuine constraints faced by the project team during implementation.

Once the projects are completed, their final achievements are evaluated against the targets by a two-member Committee (one internal and one external) appointed by the PMC, and the Institute may plan to initiate new projects based on the lessons learned from evaluation. While the project monitoring is essentially an internal process, final evaluation invariably involves external experts to assist the Institute in the evaluation process. A good practice followed in CGIAR institutes in evaluation is involvement of stakeholders. This may also be considered. The outcome of periodic monitoring of ongoing projects and final evaluation of completed projects are presented and discussed in the IRC meetings and later to RAC meetings.

All the information generated and recommendations emerged from the IRC meetings in respect of new projects approved (RPP-I), monitoring of ongoing projects (RPP-II) and evaluation of completed projects (RPP-III) are documented and stored in the Institute PME Cell. All these are submitted to the Research Advisory Committee (RAC), which comprises outside experts with the Institute Director as one of the Members, for information and advice, if any. All the information pertaining to the entire research activities of the Institute undertaken during the preceding five years are also submitted to the ICAR appointed Quinquennial Review Team (QRT) comprising external experts and Director as one of the members during the performance evaluation of the Institute undertaken by the Team once in five years.

The PME mechanism has well laid out structure and functioning, and it now looks for guidance to make it more open, transparent, objective, effective and most importantly, acceptable to the scientists to make them accountable and also acceptable to funding agencies.

1.5 PME Manual

With the integration and institutionalization of PME Cells in the Institutes, it becomes necessary to strengthen the existing PME mechanism by streamlining its

functioning. Keeping in view the saying that 'whatever cannot be measured, it cannot be managed effectively, it was felt necessary by the ICAR to infuse objectivity into the entire research priority setting, monitoring and evaluation process followed in the Institutes. This could be achieved by:

- Identifying suitable parameters/ indicators for each of these three project management functions; and
- Objectively scoring the individual research projects against the parameters/ indicators identified for the purpose.

In this context, the high-level Committee appointed by ICAR under the Chairmanship of Prof. M.L.Madan in 2011 has developed detailed guidelines to carry out Priority Setting (RPP-I), Monitoring (RPP-II) and Evaluation (RPP-III) functions in a more objective way. The recommendations of the Committee have been approved by ICAR for implementation. In order to make the broad guidelines of the Committee simple, specific and implementable in the Institutes, ICAR was contemplating to develop an open, transparent, effective, user friendly and more acceptable "PME Manual" for implementation in the ICAR System.

This onerous task of preparing the manual was assigned to the National Academy of Agricultural Research Management (NAARM) and Delhi Centre of the International Food Policy Research Institute (IFPRI) by the National Academy of Agricultural Sciences (NAAS). Keeping Prof. Madan Committee's guidelines as the template and the feedback received from the selected In-charge of PME Cells of ICAR, PME Cells In-charges located in Hyderabad-based ICAR Institutes and Directors who attended the EDP at NAARM during January, 2015, project management at the Institutes level is dealt. All the three functions of project management, *viz*. Priority Setting, Monitoring and Evaluation of research projects included in the Manual are briefly described in the following Sections.

2. Priority Setting of Research Projects

Agricultural research is an economic activity that involves the allocation of scarce resources to generate knowledge in order to increase agricultural productivity as well as to meet other societal goals. Since the expenditure on agricultural research is treated as an investment, besides improving the agricultural productivity it has to meet other social objectives. In order for the agricultural research be able to compete with other demands for the limited funds available with the Government, the ICAR has to be competitive by paying greater attention to higher productivity, greater quality, cost-effectiveness and sustainability issues. These developments call for rationalization of allocation of current and future resources for enhanced research efficiency.

In the Institutes, research resources in terms of personnel, finance and physical facilities are becoming increasingly scarce. The availability of these scarce resources often does not commensurate with the actual needs to meet the emerging challenges. At present, the research managers are facing the difficult task of identifying priorities and allocating resources among the competing research projects, with a view to optimizing the resource utilization. They have to make critical decisions, which have direct bearing on the relative importance attached to a particular crop or commodity or area of research.

In the face of increasing resource crunch and more complex problems requiring appropriate solutions, the research managers are looking for more formal methods of research prioritization at present. In fact, there is an urgent need for more systematic procedures, methods and tools for setting research priorities in agriculture now than ever before, in order to complement the informal exercises that are based on past experience and personal judgment. Institutionalizing a systematic analysis of agricultural research priorities and integrating it with an effective monitoring and evaluation system, therefore, holds the key to making the system efficient and effective. This implies that sound mechanisms in the Institute should exist to assist the research managers in establishing priorities and make suggestions to allocate its limited resources among competing projects to maximize the Institute's ability to attain its goals.

2.1 Existing Mechanism

The Institutes have established PME Cells with one Principal Scientist as its In-charge. The PME Cell has to expand its efforts in problem identification (which are the hindrances to meet vision, mission and objectives) and their corresponding researchable project in the Institute. In order to avoid losing valuable research projects for want of research

resources, there is a need to assess research priorities so that the PME Cell can make suggestions to allocate the available resources in an optimal manner to meet the demands for research services from widely varying stakeholders.

At present, majority of the PME Cells do not use formal tools in systematically planning research projects. Research planning is the responsibility of individual researchers with the concurrence of Heads of Institutes or Stations (HI/HS). The current procedures in research allocation require that the HI or HS and the scientists be familiar with the broad institutional framework so as to take it into account in their planning activities. Generally, the scientists seems to be not fully aware of the real purpose of their research (*i.e.* in relation to the Institute's vision, mission, goal), or the stated objectives. The outcome is that the funded research projects and activities are a collection of individually inspired or individually conceived projects and proposals based on individual interpretations of broad institutional objectives moderated by the Head of the Institute or Station and Divisional Heads. Even if the individual scientist is aware of the Institute's goal, the integration of different project outcomes to present on a larger canvas of institutional achievements is difficult and not clear. Therefore, priority setting by the PME Cell adds to align with the broader research agenda of the Institute, which comprises of many small multi-disciplinary projects. Lack of use of proper prioritization mechanism may reduce the effectiveness of ICAR Institutes in responding to the needs of stakeholders.

Besides the appraisal, as suggested by the Madan Committee, the PME Cell needs to prioritize individual projects to define the research portfolio of the Institute. It has to be based on parameters like alignment to Institutes' objectives, mission and vision, availability of time of project team, soundness of the project, duplication of research (if any), actions/targets formed in consonance with the expectation of the project, system review, effective control to experiments, economic evaluation and cost efficiency analysis, appropriateness of questions to be answered, *etc*.

2.2 Expectations from Research Priority Setting System

- Bring more objectivity in scope of the project;
- Aligning the objectives of project to the institutional priorities;
- Integration of projects in such a way that the institutional outcome is clearly visible and measurable;
- Rationalizing the allocation of human and financial resources to increase the overall system efficiency;

- Reduction of biasness in project proposals;
- Promotion of innovation in research;
- A mechanism for proper decision making; and
- Integration of PME into research management processes.

2.3 Priority Setting Mechanism

The goal of priority setting is to develop a common research agenda and action plan based on shared priorities. Priority setting is a fundamental step in the management of research activities because the financial resources are not unlimited and there is never as much funding as is needed to address all problems and pursue all research needs. Moreover, these needs are far from static; they can change from time to time as they can be affected by current demands, environmental conditions, demographic trends, consumer habits, and new opportunities in science due to advances in research or better research instruments. Thus, it is fundamental to start from the analysis of the current situation in order to have an evidence-based study. In the process of priority setting, it is critical to decide who sets the priorities and what criteria should be used to determine them. It is important to understand from the start that a single, universal concept of priority does not exist. A priority may look different from each stakeholder's point of view as the concept of priority serves the purpose, the capacity, the resources, the mandate, and the culture of each stakeholder. Therefore, it is important to build a participative and dynamic process among the stakeholders to reach agreement among the participants step by step during the priority setting exercise. A participatory appraisal can be undertaken by a multidisciplinary team in close interaction with stakeholders like farmers, extension workers, private sector, *etc.* periodically to understand fast changing scenario in the sector/production system.

2.4 Steps in Setting Institute Priorities

Priority setting of research at the Institute level is the key requirement for achieving the objectives and goal of the Institute towards realizing its vision. Priority identification for the Institute through ranking method is one of the simplest tasks. This can be achieved by involving the Heads of Division (HODs) in large and medium size Institutes and all the scientists in the case of small Institutes. There can be a maximum of ten priorities for a large Institute and five priorities for a small Institute depending on various parameters like staff strength, infrastructure availability, finding pattern, *etc*.

For a large Institute, the HODs and for small Institutes all the scientists need to provide broad researchable areas. They may be of any number. These researchable areas then have to be listed and a meeting of the major stakeholders identified for the purpose could be called for soliciting their considered opinion. Before the meeting, the stakeholders be given the mandate, vision and mission of the Institute. The stakeholders' opinion to be sought on a scale of 10 for different researchable areas identified. The stakeholders would rank them based on the importance of the work to be taken up to achieve the objectives and goal of the Institute in accordance with its vision. Then the average score is worked out for different area and put in the descending order. This ranking then put up before the IRC/RAC for vetting. Once this is done, the ranking of researchable areas are set. The scientists are then required to propose projects as per the priorities identified based on their specialization.

2.5 Steps in Project Priority Setting

2.5.1 Planning of the Priority Setting Process

Priority setting is not a one-time process. It requires to be taken up at regular intervals. Inviting projects from different scientists is the first step. Submission of RPP-I is the most critical factor in this planning its checklist has details of presentation of the project in the Divisional/Institutional Seminar, and action taken on the inputs, details on the workload of team, additional manpower requirements, inclusion of work plan/activity chart, status of the requirements of the equipment and infrastructure for the project and their provision in the Institute EFC, so that project does not face any problem during its operation. Priorities may be slightly amended if there is strong recommendation of IRC.

2.5.2 Elements for Priority Setting

2.5.2.1 Documentation at the PME Cell:

- The PME Cell on receiving a project document provides a temporary number to the document; the document should be given at least six weeks before the IRC meeting planned.
- The document is then put on the canvas (Annexure I) for the purpose of evaluation. The canvass has the project details on the left and the criteria for marking on the right side. It is a two dimensional canvas.
- The canvass is then provided to the evaluator, who would be asked to provide evaluation within a timeframe (may be a week or a fortnight) so that the next process at PME can be carried out in time. It is mandatory for the evaluator to provide objective evaluation.

- ❖ Average score of the evaluator will be taken into account. Average score = Aggregate of score divided by the number of criteria answered. (For example, if the evaluator has not evaluated the project on one or more criteria, then the total will be divided by 10 – (minus) the number of criteria he/she did not attempt to evaluate (Annexure I).
- ❖ Once the priority score is compiled, it has to be placed before the PMC and then the IRC for thorough discussion/decision and then approved; if the IRC suggests major change, it may be incorporated and then the process is repeated again for the steps given above. Such projects, however, will be included after deliberation in the next IRC or with the permission of the IRC Chairman to save time. But it will have to be ratified in the next IRC meeting.

2.5.2.2 Criteria for priority setting:

Criteria for Evaluation of Project on a Scale of 1-10

Sl. No.	Criterion	Score (1- 10) 10 is the Highest and 1 is the Lowest	What to See in This?
1.	**Relevance of research questions**	❖ Highly relevant = 9-10 ❖ Relevant = 7-8 ❖ Moderately relevant = 5-6 ❖ Not much relevant = 3-4 ❖ Not relevant = 1-2	Given the present situation of the need [based on: i) review of literature; ii) what other Institutes are doing in the same/ similar areas of research; and iii) a survey through PRA of different stake- holders done by a team of scientists (a PRA report made to identify the need) the relevance of researchable issue can be scored)]. ***This is basically perceived impact of research needs of the society.***
2.	**Addressing priority of the Institute and/or National priority** (National - ICAR Vision document), Institutional - Institute Vision, QRT, EFC and RAC documents)*****	Addressing: ❖ More than two National and/or Institutional priorities = 8-10 ❖ Two National and/or Institutional priorities = 5-7 ❖ Less than two National and/or Institutional priorities = 2-4	Does the focus of the project is aligned to National objectives like higher production for exports (quality + quantity); resilient to climatic changes; enhancing profitability to small holders (scale of production issues); water efficiency; value chain issues *etc.* (National goals are provided by ICAR Vision documents and strategic plans; Institute's objectives are provided by the mission and vision - Institute Vision, QRT, EFC and IRC documents)

Sl. No.	Criterion	Score (1- 10) 10 is the Highest and 1 is the Lowest	What to See in This?
3.	**New innovativeness expected in the study**	❖ Highly innovative = 9-10 ❖ Innovative = 7-8 ❖ New introduction = 5-6 ❖ Routine with new actions = 3-4 ❖ Very common = 1-2	Out of box creative idea/method/practice to overcome the constraint.
4.	**Appropriateness of design/techniques for the questions to be answered**	❖ Very appropriate = 9-10 ❖ Appropriate = 6-8 ❖ Need some modifications = 3-5 ❖ Need major modification = 1-2	**a)** Experimental design/treatments; Sampling design proposed. **b)** Data collection methods indicated. **c)** Analytical tools/techniques included.
5.	**Elements of bias addressed in the study**	❖ No bias at all = 9-10 ❖ Bias to some extent = 6-8 ❖ Biased = 3-5 ❖ Highly biased = 1-2	This covers the Disciplinary/ Personal bias exhibited by the project team members such as one sided, non-neutral, not open, prejudiced decisions to give preferences to address issues, selecting team members.
6.	**Adequacy of scientist(s) time allocation**	❖ Sufficient time allocation for both PI and Co-PI(s) = 9-10 ❖ Sufficient time allocation only for PI and not for Co-PIs = 6-8 ❖ Insufficient time allocation for PI = 3-5 ❖ Insufficient time allocation to both PI and Co-PIs = 1-2	This looks at the extent to which the PI and other members of the project team propose to devote their time to the respective project activities assigned to each one of them in relation to the time needed to carry out the work.
7.	**Extent of system review and meta-analysis**	❖ Extensive review coupled with critical analysis undertaken = 9-10 ❖ Extensive review undertaken without critical analysis = 6-8 ❖ Some review undertaken and no critical analysis done = 3-5 ❖ Neither review nor critical analysis done = 1-2	The focus here is on the rationale for the project arrived at based on the research gap identified through literature search and a survey through PRA of different stakeholders (PRA report).
8.	**Effective control to experiments**	❖ Team has full control = 9-10 ❖ Team requires partial support from other sections for physical facilities (purchase/ finance/farm and other sections) = 6-8 ❖ Partially dependent on others even for technical support = 3-5 ❖ Fully dependent on others for	All the required inputs, equipment, land, manpower and funds available before start of the project.

Sl. No.	Criterion	Score (1- 10) 10 is the Highest and 1 is the Lowest	What to See in This?
		carrying out the work = 1-2	
9.	**Economic evaluation and cost efficiency analysis**	The project to be scored based on the extent to which the anticipated benefits/cost incurred ratio works out. ❖ If more than 2.0 = 9-10 ❖ If between 1.5 and 2.0 = 6-8 ❖ If between 1.0 and 1.5 = 3-5 ❖ If it is 1.0 = 1-2	Ex-ante evaluation using partial budgeting technique as given in section 2.6 needs to be done for the project. The anticipated benefits in terms of productivity increase, quality improvement, water saving, input saving, labour saving, *etc*. accrue in relation to the cost to be incurred has to be considered. While the Institutes having trained manpower can do this without any difficulty, others have to find ways and means to do this (See Section 2.7 and Annexure II for example).
10.	**How appropriately the expected output answers the questions being addressed in the specific subject matter/area (Basic/Applied/Translational/Others)?**	❖ More appropriate = 9-10 ❖ Appropriate = 6-8 ❖ Somewhat appropriate = 3-5 ❖ Less appropriate = 1-2	The extent to which the expected output answers the questions being addressed under the respective subject matter areas to be considered.

Note: * If the proposal is not in accordance with the Institutional priorities, it may face outright rejection

2.5.2.3 Evaluator of the project proposal:

The proposals submitted by the PIs of various projects have to be evaluated using the above-mentioned criteria by some other scientist(s) of the same Institute assigned by the Institute Director (IRC Chairman). This will probably help in overcoming the problem whenever the HOD happens to be the Co-PI of some of the projects being evaluated.

2.6 Frequency of Exercise

Since the mandate and activities vary across the Institutes, the frequency of priority setting would also vary accordingly. The individual Institutes may decide upon the frequency of carrying out the priority setting exercise as per their mandate and other activities.

2.7 Partial Budgeting Method for Economic Evaluation (B/C Ratio)

Given the limitations of sophisticated economic evaluation methods like Economic Surplus, Total Factor Productivity, Simulation, etc. a very simple, transparent, very user friendly, easy to understand and compute by even biological scientists is proposed. The method, called partial budgeting, uses economic concepts and tools to estimate economic profitability of a technology. The tool can be used during any phase of the research process: technology development, testing and evaluation on farm. It is felt that partial budgeting can be used by non-economists as at this stage since most research teams of NARS lack an economist because only a few people are specialized in agricultural economics. Partial budgeting allows a quick insight into the profitability of the technologies. Partial budgeting analysis is the tabulation of expected gains and losses due to a change (marginal) in farming method or technology, e.g. replacing traditional maize variety with QPM variety. The new technology or innovation could be technically feasible but this is not a necessary condition for adoption by farmers; the new technology must be profitable. Therefore it is important for scientists developing a new technology or improving an existing one to determine the profitability of the technology. Since Indian NARS do not have enough agricultural economist and biological scientists often lack the ability to conduct economic analysis, the simple module using the partial budgeting analysis is suggested to determine the profitability of technologies at research farm or farmer level.

Partial budgets list only those items of income and expenses that change. They (i) measure change in income and returns to limited resources, (ii) provide a limited assessment of risk and (iii) suggest a range of prices or costs at which a technology is profitable. It is important to note that partial budgeting has the limitation that it is appropriate where a single component must be analysed, profitability is the major concern rather than issues such as equity and income analysis and fixed costs do not change. NARS have to follow detailed economic analysis using higher order economic evaluation tools, project worth measures, which require detailed data on streams of costs and returns including fixed research and extension costs, depreciation of technology and rate of adoption, etc. when sufficient economists are available.

In order to use partial budgeting to evaluate a potential change in a technology, a scientist has to first be able to answer four questions about that probable change:

- What new or additional costs will be incurred?
- What current costs will be reduced or eliminated?

- What new or additional returns will be received?
- What current returns will be reduced or lost?

The partial budget can be divided into three main sections: (I) costs, (II) benefits, and (III) analysis. The analysis section includes net change in profits and a break-even analysis (also known as benefit/cost ratio). The example has been given in Annexure III.

Section I – Costs	**Section II – Benefits**
A. Additional cost (This will be the cost incurred as a result of adoption of new technology) B. Reduced Returns (This will be the return that are given up as a result of no longer adoption of current technology) C. Total Cost (A+B)	D. Additional Benefits (These will be the returns received as a result of adoption of new technology) E. Reduced costs (These will be costs that will no longer be incurred as a result of giving up current technology) F. Total Benefits (D+E)
Section III-Analysis	
G. Net changes in profits (F-C) H. Benefit/cost ratio (F/C)	

3. Monitoring of Research Projects

Monitoring is one of the most important functions in research project management and it helps to ensure that the implementation of various activities included in the approved project proposal progresses as planned. The progress needs to be assessed periodically through proper monitoring so as to ensure that the objectives defined in the proposal are achieved. It is essentially a scientific judgment about the accountability of the project in accordance with the established priorities. From the project management perspective, monitoring is basically considered as an internal activity with limited participation of external experts and the entire process essentially provides scope for identifying the constraints, both physical and technical, as well as for taking necessary mid-course corrections for the successful completion of the project. Hence, a sound monitoring system is required for efficient management of research projects.

3.1 Existing Mechanism

In ICAR Institutes, the monitoring function has been very strongly built into the project management system. Monitoring is done at different levels. Through a Committee of two experts (one internal and one external) appointed, the PMC initiates the monitoring process. The main technical monitoring mechanism of research projects in the Institute is the IRC comprising its Director as the Chairman and the scientists as Members. The IRC generally meets twice a year and monitors the on-going research projects in the Institute. Besides, the RAC chaired by a professionally competent external expert with membership of external experts including the Institute Director as one of the Members meets every year and assesses the progress made by various research projects in the Institute. As far as the monitoring of progress made on matters relating to finance, procurement and other administrative functions, the IMC chaired by the Institute Director examines the progress on quarterly basis and develop necessary action plan to overcome the constraints, if any, faced by the project teams.

Annual reports, performance indicators, and Results Framework documents are other instruments that help in the monitoring of the projects, Institutes and individuals. In many Institutes, monitoring of experiments in fields and in laboratories is taken up to assess the quality of experimentation and progress of work. The frequency depends on many factors like the availability of monitoring scientists in a particular season and the Director's involvement in the monitoring process. All these mechanisms, except the IRC and RAC, have different objectives, and do not directly and explicitly monitor the progress of research projects.

Notwithstanding the fact that IRC and RAC are the major monitoring mechanisms in the Institutes, there are again no objective tools to effectively monitor the research projects. Whatever observations made by different members/experts of these two Committees are recorded and put in minutes of the meeting/proceedings form and thereby, the scope for mid-course corrections becomes limited and uncertain.

3.2 Setting Targets for M&E

Monitoring and evaluation (M&E) of project progress are done based on initially planned values for various indicators. Thus it is important that the PIs take great care in setting initial values and target fixed for each year of the project. Although a project may have a number of activities and associated targets, the PI may identify targets for a few key outputs each year that would reflect the work done and achievement made. The success of M&E depends on the PI in identifying some targets for work done (procurement, installation, data collection, experiments, *etc*.) and some targets for quality of work/achievement (quantifiable indicators on performance like publications, variety released, *etc*.). These indicators dependent targets are to be critically examined by the PME Cell. For Institute projects, the PME cell has to function like a donor and take due care in the proposal (RPP-I).

3.3 Baseline Survey

Within six months of the project approval, a baseline survey has to be taken up for the applied research projects to establish the benchmarks of selected key parameters to be used for monitoring and evaluation. The baseline survey has to be short and crisp having information not more than 5-6 key parameters collected on a maximum of one page survey schedule. The key parameters may be productivity, particular trait preference for markets, profitability, quality, *etc*. The baseline survey should include all the stakeholders to be affected by the research in the region where the project team is located. A sample of 50-100 representative respondents can be selected for this baseline survey.

3.4 Levels of Monitoring

There are basically two levels of monitoring the progress of research projects, as given below:

3.4.1 Informal Monitoring

Informal monitoring is generally followed to assess the quality of experimentation on field and laboratory and understand the constraints and progress of work. It will always be helpful to supplement the assessment through documents and reports. In biological

experiments, informal monitoring may take place by the Director/HOD/Review Team visit to the project location for examining the project status, quality of experimentation, design and condition of experiments, observations, *etc*.

For the social scientists, village visits may be a better option if it is concerned with primary data collection/extension services. If data collection is secondary, monitoring may be done by looking into the quantum of data, source of data, *etc*. and meetings with the personnel from the data source. Poster presentation session during the field visits may also be arranged for the social science subjects (Economics, Extension, Statistics, Computer Science, *etc.*). For the biological scientists also, such field visits have to be undertaken if there is a need for primary data collection/extension services.

These monitoring visits could be done at appropriate timing as decided by the IRC Chair, as indicated below:

- Monitoring can be done by constituting a Committee of Senior level scientists (maximum of five);
- The Committee may submit a note to the PME Cell on their level of satisfaction, deficiencies and probable mid-course corrections (satisfied/ need some corrections/ not satisfied); and
- This note could then be put up before the IRC along with other monitoring indicators for suitable directions.

3.4.2 Formal Monitoring

3.4.2.1 Targets and indicators:

Some of the targets and key indicators are to be used for formal monitoring of the progress, as reflected in the project documents. They include number of lab experiments/ field trials/ demonstrations conducted; data collection/ documentation done; list of publications; intellectual property generation (if any targeted); presentation of papers in Workshop/ Seminars/Symposia/Conferences (if any targeted); details of technology developed; trainings/demonstrations organized (if any targeted)**;** training received (if any targeted); and any other relevant information.

3.4.2.2 Scoring of indicators:

Project: (No. and Name) _____

Starting year _____ Monitoring Year _____

PI _____: Co- PIs _____

Sl. No.	Indicator	Output Monitorable Targets	Targets Achieved (in %)	Score (Extent of Achieving Targets)	Remarks (Constraints and Action Suggested to Meet the Targets)
1.	Activities planned	No. of lab experiments/ field trials/ demonstrations		❖ If >75% = 8-10 ❖ If 50-75% = 5-7 ❖ If 25-49% = 2-4 ❖ If< 25% = 1	
2.	Data collection/ Documentation	Variables for which data to be collected, type of analysis, records (no. and type) to be kept		❖ If >75% = 8-10 ❖ If 50-75% = 5-7 ❖ If 25-49% = 2-4 ❖ If< 25% = 1	
3.	Publications: Research Papers (Peer reviewed Journals), Reports/Manuals Working and Concept Papers Popular Articles Books/Book Chapters Extension Bulletins	No. and type of publications planned (if any)		❖ If >75% = 8-10 ❖ If 50-75% = 5-7 ❖ If 25-49% = 2-4 ❖ If< 25% = 1	
4.	Process/products/produce/ technology/ technique/ software/ knowledge developed/refined/evolved	No. of process/ products/produce/ technology/ technique/software/ knowledge developed/ refined/ evolved (if any)		❖ If >75% = 8-10 ❖ If 50-75% = 5-7 ❖ If 25-49% = 2-4 ❖ If< 25% = 1	
5.	Questions answered	No. planned (if any) to answer questions from RPP-I		❖ If >75% = 8-10 ❖ If 50-75% = 5-7 ❖ If 25-49% = 2-4	

				❖ If< 25% = 1	
6.	Trainings/demonstrations organized	No. and type planned (if any)		❖ If >75% = 8-10 ❖ If 50-75% = 5-7 ❖ If 25-49% = 2-4 ❖ If< 25% = 1	
7.	Training attended	No. and type planned (if any)		❖ If >75% = 8-10 ❖ If 50-75% = 5-7 ❖ If 25-49% = 2-4 ❖ If< 25% = 1	
8.	Workshops Seminars, Symposia, conferences attended/presented	No. and type planned (if any)		❖ If >75% = 8-10 ❖ If 50-75% = 5-7 ❖ If 25-49% = 2-4 ❖ If< 25% = 1	

Note: *Depending on the number of indicators applicable to the type of research projects implemented in a particular Institute, the scores may be proportionately made to 100*

3.4.2.3: Persons monitoring the progress:

Periodic assessment of the progress of individual projects using the above-mentioned indicators to be carried out by the scientist(s) not associated with the project being monitored and specifically assigned by the Director (IRC Chairman) from the same Institute.

3.4.2.3 Constraints faced, if any:

The project monitoring needs to take into account the constraints faced to have better insights into the project. It becomes imperative to know the reasons/constraints that affected the progress of the project. These constraints may be technical, operational, financial, procedural, or any other.

- ❖ Constraints for not achieving or partially achieving the monitorable targets need to be identified and action to rectify/ mid-course corrections to be suggested.
- ❖ If there are no constraints reported by the PI and yet the progress is in the red zone (i.e. partially achieved or not achieved), then the competent authority needs to take appropriate action.

3.4.2.4 Sequence of formal monitoring:

- The PIs submit the progress of projects and the annual progress reports by the PME Cells are put up to the IRC Meeting along with all the supporting documentary evidences. The IRC must critically look into the constraints identified by the project team. The IRC may suggest the steps/solutions for efficient implementation of the project. These steps/solutions then be communicated to the project team and others concerned for necessary action.
- The monitoring may be suggested by the Chairman of IRC taking into account different aspects of the research theme and importance of the project.

4. Evaluation of Research Projects

Evaluation generally refers to systematic appraisal of a research project to determine its quality and contributions in terms of its relevance, effectiveness, efficiency and impact. It basically involves systematic collection of information on predefined indicators w.r.t. the activities and outcomes of the project. Besides providing useful information on the outcomes of a project, it helps in assessing the performance of the scientists who undertook the research work as well as in making them accountable to those who funded the project. It will be more effective if adequate monitoring including relevant information collection and recording mechanisms are actively implemented during the course of the project. In addition, it has to situate the activity in the institutional, social and economic context in which it is carried out. It is important for the project team to be aware of the above before commencing the project. This will define how the evaluation process should be designed, and what outcomes are expected as a result.

4.1 Timing of Evaluation

Evaluation can take place at any time during the project life. It can either be carried out during the course of project implementation (Concurrent evaluation) or at the end of the project (Final evaluation). However, the most appropriate timing of evaluation in the ICAR Institutes is at the time of completion of the project which coincides with the submission of RPP-III.

4.2 Attention Required

There are a few points to be kept in view before embarking on evaluation, as under:

- Carrying out an initial exercise through a baseline survey/study so as to enable comparison of the progress with the baseline data at the end of the project. The baseline survey has to be short and crisp having information not more than 5-6 key parameters collected on a maximum of one page survey schedule. The key parameters may be productivity, particular trait preference for markets, profitability, quality, *etc*.;
- Evaluating the project at agreed milestones; and
- Evaluation on the basis achievements made against the targets set at the beginning including baseline survey targets.

4.3 Undertaking Evaluation

There is no any particular way to carry out an evaluation, with inherent strengths and weaknesses apparent in most approaches. An effective and more suitable approach involves participatory evaluation with active involvement of the stakeholders. It is important to ensure that all relevant parties have proper understanding of the evaluation process, as well as its anticipated outcomes. Basic steps involved in any evaluation process should include the following key elements.

4.3.1 Development of the Design and Plan

- Clarify the specific purpose or intended outcomes of the evaluation - Why are you doing it? Will the evaluation be in the form of a report or a series of stories;
- Determine the questions you want to answer;
- Identify the stakeholders;
- Identify key indicators; and
- Prepare any materials required such as questionnaires, field notebooks, *etc*.

4.3.2 Analysis of Information:

The collected information have to be organized systematically and put to rigorous analysis for drawing meaningful conclusions.

4.3.3 Use of Conclusions

Once the achievement and worth of the project have been evaluated, others may have to be informed about what has been learned and achieved so that they too could benefit from the experience of the project. This might guide others to undertake similar projects without hassles.

4.4 Evaluation Methods

4.4.1 Desk/ Scoping/ Pre-Project Study

This type of study is mostly followed in Basic and Strategic Research Projects whereby the key parameters are generally identified through review of literature. These are basically the lab data or field experiment data conducted before by other researchers. What is needed to evaluate in the project is to report any significant change in the key benchmark parameters.

4.4.2 Field Evaluation

Field data collection through interaction with stakeholders (sample population) will be mostly in Applied Research Projects where the results would immediately be useful to the society. For field evaluation, the following methods may be employed.

4.4.2.1 Structured interviews:

Appropriate questionnaires to be developed to collect information through structured interviews. Questions are of two types, *viz.* closed and open. Closed questions limit the respondent to a yes/no type answer, or to indicate a rating or ranking on a scale. Open questions, on the other hand, invite the respondent to provide an opinion. Questionnaires may contain both types of questions.

4.4.2.2 Semi-structured interviews – In person:

Semi-structured interviews are informally guided method of gathering information. Some questions are predetermined while others are developed from the points emerging during the discussion. Questions may be mainly open, providing an opportunity for the respondent to provide an opinion. Semi-structured interviews are used to understand an interviewee's experiences and impressions.

4.4.2.3 Administration of questionnaires:

Questionnaires can be administered in person or by telephone, or by mail. They are used to quickly obtain information from people having different background, experience and interest. Questionnaires are: i) typically inexpensive; ii) can be filled in and submitted anonymously; and iii) are easy to compare and analyse. It is possible to involve many people, but may not appeal to all and responses may be limited.

4.4.2.4 Participant observation:

In this method, the required information is collected by listening, watching and documenting what is seen and heard. By asking questions, as well as by noting comments, behaviours and reactions, useful information is sought to facilitate the evaluation process. The participant observation method gathers accurate information about how a group and project operates in the field.

Whatever method is used, it should be i) Valid – sound and correct, ii) Credible – acceptable and iii) Feasible – implementable.

4.5 Grading of Projects

The evaluation of research projects after completion is important to objectively assess whether the project objectives have been achieved as per the plan envisaged at the beginning.

The evaluation must take into account qualitative and quantitative assessment of objectives and stipulated outputs, publications, timeliness, product/process/technology/IPR/commercial value of the technology developed. Evaluation may use a relative scoring mechanism grading of the project with well-defined range of scores.

The evaluation of research projects after completion will be based on the information provided, as per the following specified proforma.

Sl. No.	**Criterion**	**Methodology**	**Score (Output)**
1.	Achievements against approved and stipulated outputs under the project	***Qualitative and quantitative assessment of objectives and stipulated outputs under the project will be carried out:***	
		❖ Projected output achieved (%).	❖ > 90% = 10 ❖ 81-90% = 8-9 ❖ 71-80% = 6-7 ❖ 61-70% = 4-5 ❖ ≤ 60% = 1-3
		❖ Extent to which standard design, methodology, experimental designs, test procedures, and analytical methods followed.	❖ Fully followed, as envisaged in RPP-I = 8-10 ❖ Modification done = 5-7 ❖ Major modification done = 2-4 ❖ Completely changed = 1
		❖ Extent to which the data justify the conclusions (%).	❖ > 90% = 10 ❖ 81-90% = 8-9 ❖ 71-80% = 6-7 ❖ 61-70% = 4-5 ❖ ≤60% = 1-3
		❖ Innovativeness and creating of new knowledge, new knowledge process, protocol, *etc*.	❖ Highly innovative = 9-10 ❖ Innovative = 7-8 ❖ New introduction = 5-6 ❖ Routine with some new actions = 3-4 ❖ Very routine = 1-2

		❖ Creation of linkages for commercialization of technology developed under the project.	❖ Very good linkages created = 8-10 ❖ Leads were found for linkages = 5-7 ❖ Not much possible =1-4
		❖ Extent to which scientific input commensurate to output (manpower, financial input and time duration) (%).	❖ > 90% = 10 ❖ 81-90% = 8-9 ❖ 71-80% = 6-7 ❖ 61-70% = 4-5 ❖ ≤60% = 1-3
		Compute the average of the above; this will be the average score for the criterion under Sl. No. 1	
2.	Publication/ awards	Assessment will be done in respect of: Research papers; Reports/Manuals; Working and Concept Papers; Books/Book Chapters; Bulletins including quality of publication (s); and Awards /Scientific recognitions received.	Depending on the number, scoring to be done, as indicated below: ❖ If > 6 = 10 ❖ If 6 = 9 ❖ If 5 = 8 ❖ If 4 = 7 ❖ If 3 = 6 ❖ If 2 = 5 ❖ If 1 = 4
3.	Additional facilities created and maintained	Facilities created in terms of laboratory, research set-up, instrumentation, *etc.* during the project.	❖ More than one created and well maintained = 8-10 ❖ One created and well maintained = 5-7 ❖ More than one created but not well maintained = 3-4 ❖ One created but not well maintained = 1-2
4.	Human resource development	Scientists and Technical personnel trained in different areas	❖ Complete team was trained = 8-10 ❖ Few of them trained = 5-7 ❖ Only one trained = 3-4
5	Training imparted	No. of demonstrations/ trainings	❖ > 90% = 10

		conducted to farmers and other stakeholders, *etc*. (against the targets given in RPP-I) (%)	❖ 81-90% = 8-9 ❖ 71-80% = 6-7 ❖ 61-70% = 4-5 ≤ 60% = 1-3
6.	Team work	Team working (Inter/Intra institutional) (Cordially working or there were conflicts/differences)	❖ Cohesively worked and achieved the target = 9-10 ❖ Cohesively worked, but targets partially achieved = 7-8 ❖ No Cohesive relations, but objectives achieved = 5-6 ❖ No Cohesive relations and objectives partially achieved = 1-4
6.	Revenue generated under the project/ avenues created for revenue generation	Resources and revenues generated and avenues created	❖ More than the cost of project = 10 ❖ Between 75-100 % of the cost of project = 8-9 ❖ Between 50-74 % cost of project = 6-7 ❖ Between 25-49% cost of project = 4-5 ❖ < 25% cost of project = 1-3
7.	Product/Process/ Technology/ IPR / Commercial value of the technology developed	Details to be provided on parameters e.g.: Products; Process; Technology; IPR; Registration of the varieties; Germplasm accession; Commercially viable value chains developed, *etc.*	❖ Two or more of the parameters achieved = 8-10 ❖ One parameters achieved = 5-7
8.	Quality of available documents of the project duly authenticated	Research Project Files (RPPs), Data, Reports, *etc*.	❖ Checklist complete and authenticated = 9-10 ❖ Checklist complete, but not

			authenticated = 7-8 ❖ Checklist not completed = < 6
9.	Budget utilization	Percentage of budget utilized	❖ For every 10%, score 1 to be added
10.	Timeliness of the execution of the project	Timely completion of the project with adverse marking/scoring for the extended period	❖ Timely completed = 10 ❖ Took six months extension = 7-9 ❖ Took one year extension = 4-6 ❖ Took more than one year extension = 1-3
Total Score			

Net Score: *Score obtained to be counted out of 100 to compensate for activities not relevant to the project*

On the basis of net score obtained from the above criteria, the projects to be graded as indicated below:

Sl. No.	Score	Grading
1.	80 and Above	Excellent
2.	70 to 79	Very Good
3.	60 to 69	Good
4.	50 to 59	Average
5.	Less than 50	Below Average

4.6 Steps in Evaluation

The PI should first evaluate the project based on the outcome indicators identified for the purpose. It should also be evaluated by an external expert identified by the Institute Director (IRC Chairman). Reasonable time and honorarium (may be a fortnight and Rs. 1000) to be provided to the external expert. Scoring of achievements against each of the indicators to be carried out and the aggregate score used for grading the project. The final grading (both by the PI and the external expert) then has to be communicated to the PME Cell through the HOD of PI, which puts it up to the Director with its comments for approval.

4.7 Economic Impact Analysis

Economic impact assessment of applied and adaptive research projects is undertaken at three levels. First, the *ex-ante* assessment, which is done to objectively assess the research

portfolio and prioritize the research agenda. The second is the monitoring and concurrent evaluation, which is done to identify the constraints for achieving the targets and suggest steps to overcome the constraints. The third stage is *ex-post* assessment, which is done to validate investment made on the research/project.

The *ex-post* impact analysis is generally undertaken when the research outputs and technologies are largely adopted in the target domain to assess their contribution to social welfare, resource conservation, trade, *etc*. The impact assessment of basic and strategic research project may have to be done keeping in view their potential for long run benefits; and in the short run they may be assessed for against the targets fixed like development of useful genes, constructs, processes, patents, publications in high impact journals, *etc*. Similarly, the impact of social science research need to be assessed differently in terms of their value in improving decision making, communication, quality of experimentation, *etc*.

In view of the shortage of economists in the NARS, systematic *ex-ante* and *ex-post* economic analysis of technologies may be undertaken in the Institutes where they are available and in other Institutes they may be undertaken with the cooperation of economists existing within the system or can be outsourced till the agricultural economists are in place.

For the present, the same module using partial budgeting technique, as explained in Section 2.7, can be made use for simplicity. Since the research team has real data at the end of evaluation, it should now be able to compute the economic benefit by replacing the earlier values (which were estimates based on certain assumptions) with the real values of the project undertaken by it (as indicated in Annexure III).

5. Utilization of Manual

The details in the Manual have been developed based on Prof. M.L.Madan Committee's Recommendations.

5.1 Focus

The Manual has been conceived keeping in view the following:

- The Priority setting, Monitoring and Evaluation (PME) mechanism has been specifically focused on research at the micro-level particularly the individual research projects in the Institutes.
- The PME process described in the Manual is essentially based on the assumption that the scientists devote considerable time for research.

5.2 Facilitators

Active consideration of the following might facilitate in realizing maximum utility of the Manual:

- The PME Cells in the Institutes to be strengthened/empowered by placing or even recruiting the right person as In-charge. To become effective, he/she requires sufficient delegation of power like a HOD enjoys and a respectable stature in the Institute with a suitable designation like Coordinator, PME. Wherever available, the Agricultural Economist should be made In-charge of the Cells and it will go a long way in providing the required technical support more effectively to the Institute Directors. In the Institutes where scientists from other disciplines are made In-charge of PME Cells till sufficient agricultural economists are appointed, they should be trained periodically in the PME process as described in the Manual.
- Further help from ICAR is needed to sufficiently incentivize PME Cell persons in giving due credit in their assessment and promotion. In the absence of the incentives and rewards, PME service is considered as thankless job, a burden and the high rate of turn-over of scientists in PME Cells will not be stopped.
- Many PME Cells are overburdened with multiple functions (more than 25) outside PME and if not rationalized, will make them ineffective. Only functions related to PME mandate may be assigned to them.
- The whole PME process is meant for incentivizing the good performance and not for punishing the poor performance. Rather it should help to improve "not up to the mark

performance". It is believed that through this process, poor performers will be indirectly motivated to perform better.

- The PME exercise will lead to more efficient and relevant research in terms of investment made. It will certainly lead to avoidance of redundant and repetitive projects.
- In view of increasing need for undertaking systematic PME exercises in the Council especially to handle emerging more complex research agenda with multiple objectives and stakeholders and demand from donors and funding agencies for credible evidences on impact of agricultural research, research on advanced PME methods and practices may be undertaken at NAARM and NCAP.

Annexure I: Method of Calculating Average Scores of Individual Project by an Evaluator

Institute's Vision:

Institute's Mission:

Institute's Mandate:

Evaluator's Name_____

Project (s) No.	Relevance of research questions	Address-ing priority of the institute and/or National priority	New innovati veness expected in the study	Appropriate ness of design/tech-niques for the questions to be answered	Elements of bias address-ed in the study	Adequacy of scientist(s) time allocation	Extent of system review and meta-analysis	Effective control to experi-ments	Economic evaluation and cost efficiency analysis	How appropriately the expected output answers the questions being addressed in the specific subject matter/area (Basic/Applied/Tra nslational/Others)	Average Score
A	B	C	D	E	F	G	H	I	J	K	L
PROJECT 1 Details enclosed	7	6	5	7	6	7	6	5	6	7	Average = (Sum of B to K)/10 = 6.2
PROJECT 2 Details enclosed	7	-	6	7	6	-	7	8	7	5	Average = (Sum of B to K)/8 =6.625
PROJECT 3 Details enclosed	6	5	4	4	5	6	5	6	7	7	Average = (Sum of B to K)/10 =5.5
PROJECT 4 Details enclosed	5	6	8	6	7	5	-	5	6	6	Average = (Sum of B to K)/9 =6.0

Annexure II: Example for Use in Priority Setting Exercise of Section 2

Ex-Ante Evaluation of Ordinary Maize Production against a Proposed Change to QPM Maize

Assumptions:

QPM will fetch higher price (Rs 1400/q) compared to present ordinary varieties (Rs 1000/q)

QPM yield will remain same

QPM will replace ordinary maize in 100 ha land in short run

Section I – Costs	Section II – Benefits
A. Additional Cost (This will be the cost incurred as a result of adoption of new technology) QPM Seed: Rs 1500/ha = 1,50,000 Fertilizer: Rs 2000/ha = 2,00,000 Pesticides: Rs 50/ha = 5,000 Labour cost: 1500/ha = 1,50,000 Research Cost = 3,00,000 TOTAL = 8,05,000	**D. Additional Returns** (These will be the returns received as a result of adoption of new technology) QPM = 2.5 t/ha Rs 1400/q of QPM = 35,00,000
B. Reduced Returns Ordinary maize = 2.5 t /ha Rs 1000/q maize = 25,00,000 (This will be the return that are given up as a result if no longer adoption of current technology)	**E. Reduced Costs** Ordinary Maize Seed: Rs 1250/ha = 1,25,000 Fertilizer: Rs 2000/ha = 2,00,000 Pesticides: Rs 50/ha = 5,000 Labour cost: 1500/ha = 1,50,000 Research Cost* = TOTAL = 4,80,000 *(These will be costs that will no longer be incurred as a result of giving up current technology*) * **Research done in past and so no cost**
C. Total Cost (A+B) = 33,05,000	**F. Total Cost (D+E) = 39,80,000**
Section III-Analysis	
G. Net changes in profits (F-C) = 6,75,000 **H.** Benefit/cost ratio (F÷C) = 1.204	

Annexure III: Example for Evaluation Purpose in Section 4

Ex-Post Evaluation of Ordinary Maize Production against a Proposed Change to QPM Maize

Facts:

QPM could fetch higher price (Rs 1300/q) compared to present ordinary varieties (Rs 1000/q)

QPM yield marginally decreased from 2.5 to 2.2 t/ha

QPM replaced ordinary maize in 100 ha land in short run

Section I – Costs	Section II – Benefits
A. Additional Cost (This will be the cost incurred as a result of adoption of new technology) QPM Seed: Rs 1500/ha = 1,50,000 Fertilizer: Rs 2000/ha = 2,00,000 Pesticides: Rs 50/ha = 5,000 Labour cost: 1500/ha = 1,50,000 Research Cost = 3,00,000 TOTAL = 8,05,000	**D. Additional Benefits** (These will be the returns received as a result of adoption of new technology) QPM = 2.2 t/ha Rs 1300/q of QPM = 28,60,000
B. Reduced Returns Ordinary maize = 2.5 t/ha Rs 1000/q maize = 25,00,000 (This will be the return that are given up as a result if no longer adoption of current technology)	**E. Reduced Costs** Ordinary maize Seed: Rs 1250/ha = 1,25,000 Fertilizer: Rs 2000/ha = 2,00,000 Pesticides: Rs 50/ha = 5,000 Labour cost: 1500/ha = 1,50,000 Research Cost* = TOTAL = 4,80,000 *(These will be costs that will no longer be incurred as a result of giving up current technology)* * **Research done in past and so no cost**
C. Total Cost (A+B) = 33,05,000	**F. Total Benefits (D+E) 33,40,000**
Section III-Analysis	
G. Net changes in profits (F-C) = 35,000 **H.** Benefit/cost ratio (F/C) = 1.011	

List of Participants of Brainstorming Session on "Developing PME Indicators & Mechanisms in NARS held at New Delhi on 12 August 2014

Sl. No.	Name	Designation	Organization
1	Dr. S. Ayyappan	Secretary (DARE) and DG, ICAR	Krishi Bhawan, New Delhi
2	Dr. Mruthyunjaya	Former Director, NCAP	NAAS, New Delhi
3	Dr. P.K. Joshi	Director, South Asia, IFPRI	IFPRI, New Delhi
4	Dr. S. Anandhan	Senior Scientist	DOGR, Pune
5	Dr. K. N. Bhilegaonkar	Principal Scientist	IVRI, Izatnagar, Bareilly
6	Dr. S. Chatterji	Principal Scientist	NBSSLUP, Nagpur
7	Dr. P.K. Chhonkar	Editor	NAAS, New Delhi
8	Dr. (Ms.) Prem Dureja	Editor	NAAS, New Delhi
9	Dr. Seema Jaggi	Senior Scientist	IASRI, New Delhi
10	Dr. Rajani Jain	Principal Scientist	NCAP, New Delhi 110012
11	Dr. Ravinder Kaur	Project Director	WTC-IARI, New Delhi
12	Dr. Brij Lal Lakaria	I/C PME	IISS, Bhopal
13	Dr. (Mrs) P. Mahalakshmi	Senior Scientist	CIBA, Chennai
14	Dr. Meena Malik	Associate Professor	NDRI, Karnal
15	Dr. S. Mauria	ADG (IPTM & PME)	ICAR, KAB-I, Pusa, New Delhi
16	Ms. Gayathri Moharana	Scientist	DRWA, Bhubaneswar
17	Dr. B.N.S. Murthy	Principal Scientist	IIHR, Bengaluru
18	Dr. S.K. Nanda	In-charge, RSM	NAARM, Hyderabad
19	Dr. K. Srinivas	Pr. Sciebntists	NAARM, Hyderabad
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23	Dr. P. Ramasundaram	National Coordinator	NAIP, New Delhi
24	Dr. P.K. Sahoo	Principal Scientist	DCFR, Bhimtal
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27	Dr.(Mrs) Shivani	Principal Scientist	ICAR RC for ER, Patna
28	Dr. N.K. Singh	National Professor	NRC-PB, IARI, New Delhi
29	Dr. N.K. Tyagi	Former Member	
30	Dr. M.P. Yadav	Ex. Vice Chancellor	
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32	Dr. M L Madan	Ex VC and DDG, ICAR	

List of Participant of PME In-charges of ICAR Institutes for a Meeting to Crystalize PME Manual held at Hyderabad on 24-12-2014

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1	Dr. Mruthyunjaya	Former Director, NCAP	NAAS, New Delhi
2	Dr. T. Balaguru	Former Head, ASRMP	Hyderabad
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5	Dr. V. Dinesh Kumar	Principal Scientist	ICAR-DOR, Hyderabad
6	Dr. S.Vaithiyanathan	Principal Scientist	ICAR-NRC Meat, Hyderabad
7	Dr. Harvinder Talwar	Principal Scientist	ICAR-IIMR, Hyderabad
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