

**Institutional Arrangements
and Strategies for
Research and Development in the Future**

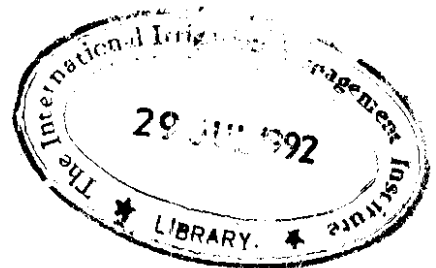
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IMPISA

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INSTITUTIONAL ARRANGEMENTS AND STRATEGIES FOR RESEARCH AND DEVELOPMENT IN THE FUTURE

1. INTRODUCTION

The overall goal of irrigated agricultural research must be that the results of research should significantly influence actual practices in the field leading to greater productivity, profitability and sustainability without causing environmental degradation. The research results must be useful to all connected with irrigated agriculture: the farmers., operators of irrigation systems, designers, consultants, policy makers, donors and consumers. Based on this objective, the Staff Worlang Paper #6.1 has identified seven broad areas of relevance and provided guidelines for prioritizing research needs considering the institutional infrastructure and resources (both manpower and financial) availability.

At present, there exists little institutionalized capacity for generating irrigation-related innovations, identifying research needs and implementing, interpreting, and adopting research findings to improve the performance of irrigation systems. Within the implementing agencies, institutional capacity **is** to be established to carry out research as well as ~~to~~ manage research, and ensure that policy review, innovation and decision-making with regard to irrigation operation and management are well supported by research.

This IMPSA Staff Working Paper (SWP#5.2) "Institutional Arrangements and Strategies for R and D in Future" **is** intended to be one of two SWPs which will be used as an input to IMPSA Policy Paper 5: "Achieving High Productivity in Irrigated Agriculture: A Programme for Research and Development (R&D) for Technology Generation and Diffusion."

The main objectives of this worlung paper are to review the present working of research organizations related to irrigated agriculture in this country, identify their strength and weaknesses and then suggest institutional arrangements and strategies for future research and development in imgated agriculture.

In particular, the following will be attempted in this paper: '

- i) What are the institutions presently doing irrigation-related research, their areas of expertise and interest, strengths and weaknesses, linkages With other organizations, funding sources, etc;
- ii) What additional institutional arrangements are contemplated for irrigation research, for example the research management unit of the Irrigation Department? What are their staff structure; functions, roles, responsibilities and powers, linkages with national and international organizations, funding mechanisms, coordination, etc ;
- iii) What **are** the present and potential relationships and synergy among these research institutions?
- iv) What kind of strategy is to be adopted for future research and development using rehabilitation projects such as NIRP, MIRP and ISMP as vehicles?
- v) What should be the funding mechanism for R and D?
- vi) What should be the mechanisms for utilizing the research results in the field and the mechanisms for evaluating the impact of research on irrigated agriculture?

11. Methodology

This paper has been prepared based on the following processes and sources of information:

- i) A small consultative panel was constituted, consisting of representatives from ID, IMD, DOA, DAS, MEA, AR&TI, the University, private industries and representatives from the IMPSA Secretariat and IIMI/SLFO. This panel held two meetings to discuss the key issues, and is a major source of the data and ideas in this report;
- ii) Background data gathered by IIMI and IMPSA staff from various literatures;
- iii) An informal consultative workshop with a wider group of researchers at which a draft of this paper was presented and views of the participants were elicited on Institutional Arrangements and Strategies for R and D in Future. The workshop participants comments and suggestions are reflected in the final document of this paper.

2. ORGANIZATIONS AND STRUCTURES

2.1. Agricultural Research

At present, agricultural research is carried out in at least 19 separate research institutes and departments which function under six ministries. However, the Ministry of Agricultural Development and Research (MADR) is responsible for research and development of all crops except for rubber, tea, coconut, sugarcane and cashew. It has four separate research units:

Department of Agriculture (DA), Department of Agriculture Exports (DAE), Agrarian Research and Training Institute (AR&TI), and the Department of Animal Production and Health (DAPH).

2.1.1. Department of Agriculture (DA)

The Director of Agriculture is responsible for the Development and dissemination of new technology for the farm sector and is specifically responsible for food crops. He has working under his supervision a Research Division headed by a Deputy Director. Improved technology generation is the responsibility of the research division. The research division is responsible for the formulation of the national research strategy for food crops, including the establishment of priorities, facilities and staff. Research is organized on a regional basis. There are nine regional research centers (RRC) (based on agro-ecological regions) and two special units - one for the land and water-use and the other for soil conservation.

Research programs are being formulated at the regional level within broadly defined operational objectives. Close linkages have been established with extension services and farmers through the formation of regional technical working groups which meet twice a year. The overall program of the research division is considered by divisional (committees and later at meetings of division heads chaired by the Director of Agriculture.

For funding research programs, a consolidated budget is forwarded through the Secretary of MADR to the Ministry of Finance and Planning. Allocations are made to MADR under separate headings such as research, extension, etc.

2.1.2. Department of Agriculture Exports (DAE)

This department started in 1972 and is mainly responsible for a large number of non-food crops which have local and potential export markets. There are two divisions under a director, one of which is a research division. Its functions are mainly formulating research programs and obtaining funds for research which are similar to the research divisions under the department of agriculture.

2.1.3. Agrarian Research and Training Institute

This is a autonomous unit established by an Act of Parliament and is governed by a Board nominated by the Minister of Agricultural Development and Research. There is a wide representation on the Board. The composition of the Board reflects AR&TI's mandate to work on research and training, socio-economics and institutional aspects of agriculture. AR&TI is the only major state organization in this area and has the largest group of socio-economists in the country. It is organized into four research divisions, i.e. the Agricultural Planning and Evaluation, Production Economics and Extension, Irrigation, Water Management and Agrarian Relations, and Market and Food Policies. Each research division is headed by a research and training officer.

The budget is received through the MADR, but is at the disposal of the director for programs agreed-upon by its Board. The budget covers only staff and institutional costs. All program operating costs must be obtained from other sources. Hence the program consists mainly of contract work for development projects which provide funding.

2.2. Sugarcane Research Institute (SRI)

The Sugarcane Research Institute which is under the Ministry of Plantation Industry was established in 1981 as a autonomous institute to provide needed research support to expand to other new areas under both irrigated and rain-fed conditions. Most of the contemplated research on sugarcane will be of an applied adaptive nature.

2.3. Water and Land Management Research

The Ministry of Lands, Irrigation and Mahaweli Development has two departments to carry out small research programs in water and land-related subjects.

2.3.1. Irrigation Department

The Irrigation Department is mainly concerned with the supply of irrigation water for crop production. The Land Use Division of this department is responsible for the national soil survey. The Irrigation Department carries out research in two areas: designing of irrigation water supply and distribution structures and land capability surveys, and in land-use planning. The Irrigation Department conducts some research on on-farm water management supported by grants. Linkages established with MADR and the Ministry of Mahaweli Development to identify research problems in some areas are not continued now.

Presently, not much research related, to irrigation management and irrigation institutions except in ISM project is being carried out either in the Irrigation Department (ID) or in the Irrigation Management Division (IMD). Strengthening of the research capacity of the recently established Irrigation Management Division under the Ministry of Lands, Irrigation & Mahaweli Development (MLI&MD) to carry out institutional research and Irrigation Department to carry out irrigation management research are very important and their roles in research are to be strengthened.

2.3.2. Forest Department

The research unit under this department concentrates on studies of botanical characteristics of indigenous species and management of natural forests. The other activities of this unit includes, forest management studies which range from watershed management practices to preventing siltation of large tanks and community forestry.

24. Ministry of Higher Education

Out of five main units, four of them are concerned with irrigated agriculture in one way or the other. They are:

- i) Faculty of Agriculture, University of Peradeniya
- ii) Faculty of Agriculture, University of Ruhuna
- iii) Faculty of Agriculture, University of Batticaloa
- iv) Post-graduate Institute of Agriculture (PGIA), Peradeniya

The funding for teaching in these universities is provided from the University Grant's Commission; MHE funding for research is quite inadequate; research, therefore, depends largely on external funding. Funding for training at PGIA comes from several sources, including DOA, which sponsors members of its own staff.

A brief review of literature as detailed above indicates that not much focus was given in the past and in fact, very little work has been carried out on multi-disciplinary irrigation management research to improve crop productivity and farmers' profitability of irrigation systems; most of the research are of disciplinary nature, primarily meant to satisfy the design and operational requirements of the line agencies and have not addressed the issues faced by the irrigation systems in a holistic manner.

The review also indicates that there exists weak linkages between policy makers, farmers, implementing agencies and researchers; inadequate channels of communication between the line agencies research institutions; absence of a forum to develop and prioritize national irrigation research needs; inadequate level of operational funds and insufficient emphasis on research areas that need participation of more than one research institution.

With the self-management of smaller systems by farmers' organizations and joint-management of larger schemes both by the agencies and the farmers' organizations, there is bound to be a great demand for research results to improve their technology, procedures and practices; this in turn will create a definite need for research to respond to practical problems that farmers are facing; unless research is seen as responsive to farmers' problems, it soon loses its credibility among both farmers and agency staff. If it is to become more responsive researchers have to recognize that social and economic aspects of the problems as well as institutional aspects are as essential as technological ones.

Although the need to strengthen research and improve the performance of the system is becoming well recognized both at the operating and at the policy levels, this recognition has to be institutionalized with consistent and sustained funding. New improved operating and management procedures require changes in staff incentives, training and career development.

The short-term goal of research is to improve agency involvement and thereby to promote innovations more relevant to farmers' needs and improve their crop productivity and profitability; in the longer-term the goal is to develop systematic methodology for implementing cost-effective research innovations both technological and management-oriented that can be more successfully implemented and sustained for raising high value commercial crops profitable to farmers. In addition, research and participatory management programs have to demonstrate their accountability and effectiveness through their outputs; only then they will help elicit the sustained **support** from policy-makers that is essential to their success.

3. PROPOSED ORGANIZATIONAL STRUCTURE, FUNCTIONS AND ROLES

The organizational structure of a research system provides the institutional framework that links research with its social, political and economic environment. It defines the system governance, its autonomy of decision-making, the degree of centralization and other factors that make it function.

IMPSA Policy Papers 2 and 3 propose that for long-term modernization of the irrigated agricultural sector, applied adaptive research will be vital. It is expected that the irrigation management agency - primarily the Irrigation Department, in this case will develop a capacity for identifying research needs, getting the research done, interpreting, communicating and utilizing the results. This will be done through the establishment of a Research Management Unit (RMU) within the department. For guiding the **RMU**, a Joint Research Committee (**JRC**) will be instituted with participation from both the Irrigation and Agriculture Agencies. The committee will, in addition, include representatives from the Mahaweli Authority, IMD, DAS, AR&TI, IIMI, universities and the private sector.

IMPSA Staff Working Paper #4.1 on 'Building the Capacities of the Existing Irrigation Department and Irrigation Management Division' has produced an organogram depicting the proposed new structure of the Department. In this organogram, a Research Management Unit (RMU) headed by a Deputy Director is included under an Additional Director for Irrigation Management. The Deputy Director (RMU) will be responsible for implementing management and technological innovations with the assistance from the Joint-Research Committee. These proposals and decisions were considered while preparing this working paper.

The proposed RMU is essentially a research-based service organization dedicated to improve the crop productivity and farmers' profitability of irrigated agriculture through technological and management research. Through research efforts, it supports and backstops its advisory service to implementing agencies and farmers, and help disseminating research results through action research, training, conducting workshops and publications of research results.

The Research Management Unit will have a multi-disciplinary team with client-centered **problem solving orientation and established in the** Irrigation Department. **Engineering** and

management, agriculture and agronomy, and economics and social sciences will be among the disciplines represented in the staff of RMU. In addition to a multi-disciplinary team, RMU will also have applied engineering-oriented research teams covering areas of interest, such as hydraulics, hydrology, soil mechanics, irrigation structures, irrigation engineering, etc; these sub-units will be manned by suitable engineering personnel. The RMU will be headed by a Senior Deputy Director; any one of the disciplinary staff represented in the RMU is eligible to become the Head/Director of that unit. For building effective participatory systems, the requirements for leadership of RMU are quite different from those traditionally expected of a leader in a hierarchically designed organization. The leader should be able to project a vision of the unit's mission, and then guide and facilitate the changes necessary to advance towards that vision. He must be a person with broad background, considerable experience in conducting multi-disciplinary irrigation management research and having had experience in managing and implementing research projects.

The main objective of the RMU is to strengthen institutional capacity of irrigation agencies including FOs in carrying out field-oriented action research and to improve crop productivity and farmers' profitability through innovations of irrigation management research.

The specific objectives of the RMU are:

- i) to identify research needs, contract for research, evaluate results, and adopt them for implementation;
- ii) to support a research program which yields results of immediate interest to the irrigated agricultural sector and provides a training ground for RMU staff;
- iii) to work in partnership with other research institutions including private sectors involved in irrigated agricultural research as well as with the implementing agencies. All planning is done jointly on partnership basis.
- iv) to act as an adviser to the implementing agencies; and assist agencies/organizations, on a long-term basis, in their efforts to strengthen the organizational and management capacity of their research systems;
- v) to ensure policy review, innovation and decision-making in irrigation management are well supported by research; and
- vi) to contribute to the quality of planing and implementation through well-tested field results.

The working of RMU will be guided by a Joint Research Council. The JRC will be a formal mechanism to ensure that an integrated research program is developed and implemented through RMU. The JRC will also have linkages with CARP and ministries relating to irrigated agriculture including finance.

The JRC as enunciated in the Policy Paper 64.2 will be a sub-committee of the Central Coordinating Committee constituted for implementing the irrigation management policies. This will be a high level committee represented by ID, MASL, DOA, IMD, DAS, AR&TI, universities and private sector representative, two distinguished irrigation management scientists, a nominee from PMU and Director, RMU. The Director, ID will be the chairperson of the committee; the Head/ Director of RMU will be the Secretary of this committee. The members of the committee will be nominated by the respective departments and the two scientists appointed by the members of JRC. The members will hold office for not more than two-terms each term extending for a **period** of three years. The committee will have a small secretariat supported by the RMU. The committee members are to be compensated for their time and efforts put in for the committee work. The main functions of this committee are:

- i) Guide and facilitate RMU in planning, prioritizing and implementing research programmes;
- ii) Approve and recommend to the Director, ID for his approval: research strategy, annual programme, work plan and budget prepared by the RMU;
- iii) Liaise with funding ministries and CARP for research policy review and mobilizing resources;
- iv) Recommend establishing a coordination/implementation committee for each of the project undertaken for implementation and monitor the project progress through these committees;
- v) Review and suggest corrective measures, if needed, for the working of RMU based on the evaluation report received from the planning and monitoring unit of ID;
- vi) Help strengthening RMU through fellowship for training and research.

The expert panel constituted for this working paper recommends the following in respect of RMU and JRC:

- i) A sound basis for irrigation research growth and development has to be established; the graduates and professionals passing out of the educational and training institutions do not have sufficient knowledge and skills to undertake RMU activities straight away; those who are recruited for RMU must go through a training program in irrigation technology/management of three to six months duration in one of the universities/institutions in the country where adequate facilities exist;
- ii) Scientists selected for RMU be given training in research management at a relatively early stage in their career;

- iii) A systematic programme through provision of post-graduate fellowships for training and research be instituted and administered by the JRC to produce sufficient number of post-graduate qualified candidates per year;
- iv) Field-based action-research program requires adequate supporting staff to effectively implement the program. The committee recommends that at least 2 technical support staff per scientist be provided, initially;
- v) Improved transport and travelling allowances are essential if researchers are to get out into farmers fields and to interact with farmers and implementing agencies;
- vi) The system of administrative and financial control can have either a stimulating or a stultifying effect on research performance. The system used for control of development operations is not suitable for research operations. A flexible financial and administrative arrangements which could serve as model for beneficial changes be introduced;
- vii) Linkages and communications between the RMU and other servicing units within the ID has to be strengthened; mechanisms for interaction among different units of the ID are to be developed;
- viii) There is a serious gap in linkages between research group and policy makers and planners at the ministry level. It is recommended that the JRC should take up the responsibility of ensuring two-way transfer of information, so that research can make its best contribution to highlighting development opportunities, and solving development problems. The JRC would also be the main channel on research to communicate with the National Planning Division;
- ix) It is recommended that reward and promotion procedures for research staff reflect performance in research and not merely seniority and administrative responsibilities; non-monetary incentives, award for best work, attendance in training, participation at national and international conferences need to be considered;
- x) Two options were suggested by the expert panel for funding the irrigation management research: the first option relates to provision of a certain percentage of funds of the country's irrigation-related Agricultural Gross Domestic Product (AGDP). The percentage suggested is 2%; however, this amount relates to all research activities of agriculture, agro-processing and irrigation; the second option suggested is to earmark required funds for research based on the amount spent on operation and maintenance of irrigation systems; it is suggested that 5 to 10 percent of the annual O&M funds can be set apart for the irrigation research.

The two alternatives were presented before the consultative workshop participants. on research needs and priorities; the workshop recommended the following allocation

based on 2% of AGDP. 40% of 2% for irrigation research; 40% of 2% for agriculture, and the remaining for socio-economic aspects of irrigated agriculture.

4. RESEARCH METHODOLOGY

In irrigated agricultural research two things have become clear: first, that there was little 'demonstrated technology' that could be transferred to farmers without local refinement or adaptive research; and second, that farmers are not passive recipients of recommended technologies but active researchers and developers in their own right. The fact that the farmers and implementing agencies should be active participants in the research and development process and not simply subjects to be directed by the professionals leads us to adopt a methodology known as 'Participatory Action Research (PAR)' which is a powerful tool to advance technology and practice. PAR involved practitioners in the research process from the initial design of the project through data gathering and analysis to final conclusions and actions arising out of the research. Participatory action research is a kind of research where farmers and implementing agencies are involved in the research programme along with the researchers on an equal footing. In such a strategy, the researchers may be able to identify the factors in various types of situations and with varying structures and processes of participation, that are conducive to the development of participatory projects that are not only satisfying to participants but also lead to improved task performance.

Participatory Action Research is different from the conventional expert model research. In the expert model research, the professional researcher is called by a client organization or talks his way into study a situation and a set of problems to determine what the facts are, and to recommend a course of action. In this type, the professional researcher is completely in control of the research progress except to the extent that the client organization limits some of the research options. This type of research is perfectly appropriate where the objectives of both researchers and the decision-makers have to simply get the facts and examine action implications.

Those aiming to help organizations carry through major processes of socio-technical change have come to recognize the limitations of the professional expert model. In such situations, we need to develop a process of change resulting in organizational learning over considerable period of time.

The second kind of research which we call Participatory Research (PR) in which several members of the organization get involved in gathering and analyzing data, writing joint reports, etc.; in these cases, the expectation is that the collaboration would do some good for some people at some time, but such a research has no action objectives.

Until recently, in irrigated agriculture, the technology transfer model of research and development prevailed. According to this model, it was the responsibility of the professionals to determine what worked best for farmers, and then persuade the farmers to accept the information and ideas of the professionals. In other words, this was strictly a top-down model

which had no place in it for utilizing the information and ideas gathered by small farmers in helping them to better their lot. The dominance of this model was strongly reinforced by the great success of plant scientists in developing high-yielding varieties of the basic grains such as wheat and rice.

We all realize that irrigation system is a socio-technical system. The socio-technical systems framework presents one simple but important idea: that the work place is not simply a social system; understanding behavior at work depends on integration of social and technological factors. The best way to gain enough knowledge regarding social and technical factors and integrate them is to move from treating the practitioners of the technologies as passive informants to involving them in the research as active participants. If we learn some of what they already know through their experience and practice, we would be better off if we invited them to participate with us in the research process.

For field-based action research, it is important to recognize the distinction between project success and diffusion to similar projects; we often encounter projects that are successful by any standard of measurement and yet do not lead to diffusion to other organizations. We need to discover not only what works in a given situation but also what processes of organizational learning enable people to apply the lessons derived from one situation to other cases.

In general, farmers and implementing agencies learn from their colleagues better than from researchers. Researchers can support the organizational learning process by helping to organize human networks that stimulate and facilitate this learning. They can arrange for site visits, including some observation of operations, and considerable and wide-ranging discussions with the key management people and selected farmer representatives.

The RMU can develop human and inter-institutional network with International centers carrying out studies in irrigation management to stimulate organizational learning through the flow of information and ideas.

In participatory action research, the researcher must rely upon rational course that meets the needs and interests of both implementing agencies and the farmer beneficiaries.

Applied research in irrigation management is necessarily interdisciplinary involving the integration of information from social-science, engineering, agronomy and economics. Participatory action research offers more effective strategy for the interdisciplinary applied research projects.

5. IMPLEMENTING STRATEGY

- i) The first important step is to constitute the Joint Research Council: The terms and reference, must be framed and the committee with a small secretariat in the ID is to be established. This can be done through a local short-term consultancy contract to an

organization specializing in this type of work. The responsibility for this activity rests with the Director, ID. The JRC will assist RMU in identifying and in implementing the research projects and will also facilitate inter-departmental collaboration on research;

- ii) The proposed NIRP (National Irrigation Rehabilitation Project) will be used as a vehicle to develop a RMU within the ID with technical assistance from IIMI;
- iii) Initially, the RMU will cater to the needs of the ID, IMD and DAS. It will interact with the research units proposed to be set-up under the Mahaweli Economic Agency (MEA) providing research guidance and assistance. As and when the MEA amalgamates with the ID, the research units of MEA will also come under the fold of RMU. Until that time, the research activities of MEA will remain separate;
- iv) The RMU will initiate, identify research issues, contract, implement and adopt research results in the rehabilitation project. It will work closely with the Department of Agriculture, Faculties of Agriculture in the universities, and interested private firms with necessary expertise and interest.
 - a) The following institutional requirements will be jointly developed by ID and IIMI and get it approved by the JRC:
 - a mandate for RMU and strategic plan for the next five years;
 - an organizational structure and staffing policy, followed by recruitment, orientation and training of personnel;
 - research procedures, policies and plans;
 - a work plan that includes a strong monitoring and evaluation component.
 - b) The RMU in association with IIMI will develop and implement a research program through following steps:
 - undertake rapid assessment surveys, particularly to obtain preliminary data and prioritize research issues;
 - carry out adaptive research to test institutional innovations, water control innovations and testing of crop diversification recommendations;
 - monitor and evaluate improvements implemented to ascertain their acceptance, benefits and costs, and long-term sustainability;
 - measure the cost-effectiveness of the innovations identified by the research program.

- v) Based on the lessons learned during the first phase of implementation with the NIRP project, the **RMU** will be expanded and strengthened to carry out irrigation management and technological research.