Evaluation

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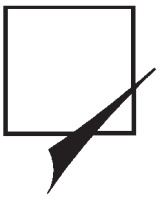

Patronage and Evaluation in the Indian Council of Agricultural Research

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This article examines the crucial role of scientific expertise and authority, in evaluation as well as in research decision-making. The case of the Indian Council of Agricultural Research (ICAR) is used to demonstrate how the bureaucratic imperatives in a public research system can thwart the cause of scientific authority and accountability. Research decision-making is a function delegated to different points, or 'nodes', vested with scientific expertise and the power to make decisions. Scientific expertise is the basic asset used by the nodes, which may be individual scientists and/or groups, boards or organizations. Patronage or decision-making in the ICAR is, for the most part, vested in bureaucratic nodes, marking the dichotomy in the organization between scientific and administrative or financial decision-making. The concluding section of this article highlights the social reproduction of bureaucratic nodes, which perpetuates the marginalization of evaluation. The nodes in the ICAR rely on bureaucratic decision-making not validated by evaluations or assessments using scientific expertise. It is argued that stringent evaluation can replace bureaucratic authority with scientific expertise and authority, thereby bringing more accountability to the system of patronage of science.

1. Introduction

The contribution of agricultural research to agricultural development is now widely accepted. Institutional reform in the National Agricultural Research System (NARS) has long been identified as a crucial input to ensure that research and development meet the agricultural development goals of the country.[1] Changes in the organization and funding of research have received precedence over other forms of institutional reform. Stringent monitoring and periodic evaluation are important tools in the institutional reform kit (see Horton et al., 1993; Acharya, 1986; Tabor, 1995). Unfortunately, they have almost always been the least preferred.[2] Historically, institutionalization of a monitoring and evaluation system within a NARS seems to have been prompted by concerns other than effective performance or greater public accountability of the NARS. These

concerns range from straightforward advantage-seeking behaviour of scientists, such as career advancement, to bureaucratic-financial imperatives such as research project audits. This article examines the crucial role of scientific expertise and authority, in evaluation as well as in the research decision-making capacity of an agricultural research organization. The article presents the evaluation experiences of the Indian Council of Agricultural Research (ICAR hereafter). This case argues in favour of institutionalizing a stringent evaluation system. Stringent evaluation of agricultural research is a prerequisite to building the scientific authority and accountability needed for responsible research decision-making.

The British Government of India founded the first agricultural research stations and appointed the country's first public agricultural research service personnel. Today the NARS in India is composed of the ICAR, the 28 State Agricultural Universities (SAUs), special commodity research stations under the Ministry of Commerce, private research organizations, and general universities (Figure 1). Of these, the ICAR and SAUs, the cardinal components of the NARS, employ 4212 and 17,045 scientists respectively, making a total research commitment of 12,300 full-time equivalents, given that agricultural scientists

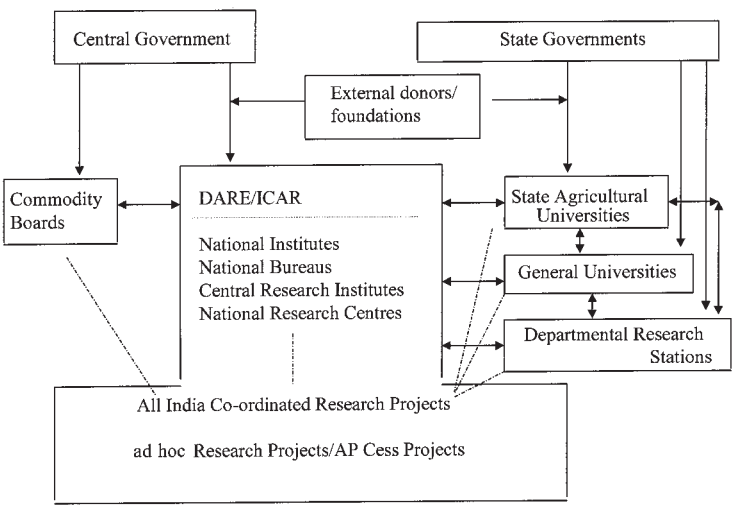

Figure 1: Organization of the NARS in India: the Public Sector

Source: Adapted from Rajeswari (1992); Randhawa (1987).
Note: The All India Co-ordinated Research Projects and the ad hoc Research Projects are ICAR projects, which are spread over and shared (financial and personnel resources, and facilities) among several institutions within the ICAR and the NARS. The dotted lines indicate the institutions that share the co-ordinated and ad hoc projects. Arrows indicate flow of funds and double-headed arrows indicate research sharing among institutions. Though not shown here, the regional research stations of the Commodity Boards under the central Ministry of Commerce have research and training linkages with the local State Agricultural Universities.

devote their time to three main functions, viz. research, teaching and extension education (World Bank, 1990).

This article explores the evaluation experiences of the ICAR, which conducts research in 3 National Institutes, 39 Central Research Institutes, 4 National Bureau, 30 National Research Centres, 77 All India Co-ordinated Research Projects and 160 National Agricultural Research Projects (located in 121 Zonal Research Stations under the 28 SAUs) (ICAR, 1994). The Council is the single largest research organization in the country and accounts for 64 percent of total public agricultural research expenditure. Though we limit this study to evaluation experiences within the ICAR, the extent of centralization within the NARS has ensured that almost all the experiences of the Agricultural Research Council are also reflected in or have impacts on the State Agricultural Universities.[3]

Section 2 draws on the concepts of patronage and delegation to develop an analytical framework to explain evaluation and decision-making in scientific research. Research decision-making is a function delegated to different points or nodes, vested with scientific expertise as well as the power to make decisions. Scientific expertise is, theoretically, the basis for evaluation of research and research decision-making, often based on the evaluations or assessments by the experts. Scientists, as individuals or as members of groups, boards or organizations, function as decision-makers through these nodes as well as evaluators. Section 3 presents the history of the organization and evolution of decision-making in the ICAR. Major changes in organization and research decision-making are examined in the light of the external evaluations and reviews of the Council. Though these External Reviews helped establish agricultural scientists as a community of experts with specific professional demands, the creation of an appropriate system of incentives and evaluations continues to be a problem within the Council. Section 4 examines the various types of internal evaluations in the Council. These disjointed internal evaluations have added to the Council's perennial problem of organizational dichotomy – between scientific and administrative/financial decision-making. The nodes, the points of delegation for research decision-making, in the Council have always been bureaucratic, endowed with power without accountability. Section 5 concludes with a call for stringent evaluation to build the scientific expertise that can replace bureaucratic decision-making in agricultural research with scientific research-decisions based on the authority and accountability of experts.

2. An Analytic Framework

2.1 Nodes, Expertise and Evaluation

Theoretically, there is a relationship between the system of patronage and the evaluation of research.[4] First and foremost, 'evaluation is an input to the decision-making process' (Nogueira, 1984). 'Systems of patronage are resolutions of the mismatch between the distribution of discretion and the distribution of knowledge' (Turner, 1990: 208). This mismatch, between the distribution of funds and power (the main sources of discretion) and the distribution of knowledge

constitutes the 'uncheckability problem'. 'Uncheckability' is resolved through a 'pure' patronage relationship or any of the innumerable modern 'impure' patronage relationships. Delegation of funds from a donor or patron directly to a scientist 'without any mediating structure of organization' (Turner, 1990: 187–8) to make allocative decisions is pure patronage, and is absent in almost all the modern systems of patronage of research. The patron in a pure patronage relationship 'trusts' the scientist; there is thus an *ex ante* expectation of results and perhaps a vague evaluation of the scientist's work.[5] Modern institutionalized systems of patronage come with well-defined research and development policies, thereby specifying expectations of results and seeking a guarantee that these very results will be achieved. They trust the scientists to work towards realizing these ends. In these systems of patronage, evaluations and assessments are critical to the patron's need to understand the research content as well as the capacity to make decisions about research work.

Evaluation of research helps the patrons to resolve the uncheckability problem arising mainly from the patron's lack of specialized scientific knowledge.[6] In modern scientific research, when funds and power are distributed in the hands of a few (say, directors, research managers or bureaucrats) and 'specialized scientific knowledge is distributed among a large number of specialized scientists whose work can be best judged in small and often very intimate intellectual communities' (Turner, 1990: 208), evaluation plays a critical role both in the organization of research and in the system of patronage. The patron state (in the case of public system of patronage) resorts to a regularized series of delegations to distribute funds and the power of discretion. These points, at which significant discretion is exercised, are the 'nodes' (Turner, 1990: 205), the points at which the uncheckability problem is resolved.

Nodes may be individuals (directors, research managers, peers etc.) within organizations, or groups or organizations (Research Committees, Government Departments of Science and Technology, the University Directorate of Research etc.), vested with the power to make research decisions. These research decisions will concern project appraisal and selection, allocation of funds and facilities, assignments of work/research contracts, monitoring of research programmes, peer reviews of research results/personnel, evaluation of research programmes and the like. The power of the nodes to make research decisions derives from the expertise of their members. Given that knowledge is specialized, judgement about its worth, likely success or failure, as well as allocation of funds for research in these specialized scientific niches, is possible only at these nodal points of delegation, where experts in the relevant area of scientific research have the decision power. There is at these nodes a convergence of multiple capabilities and functions. The director of a research institute, besides being a node, making and implementing all important research decisions within the institute, will also be (part of) another node of peer reviewers for research projects in her/his area of scientific expertise. Whether embodied in their respective functions, as individuals or groups, all nodes are characterized by the discretionary power derived from scientific/managerial/administrative expertise available with the member(s) peopling the node. For instance, the composition and location of the node within an institute depends

on the functions it is expected to perform. The director of the research institute will be part of a 'scientific' node (Research Committee) to appraise, select and fund or evaluate projects, as well as part of an 'administrative' or 'financial' node (Project Accounts and Audit Committee) to monitor and assess financial performance of the research project (which in agricultural research institutes includes decisions about rent on plots for multi-location trials or the sale or auction of produce from commodity research projects).[7] The same nodes or decision-makers, and often the same processes or analytical frameworks, work to decide whether a particular research project should be funded or not, and to (assemble peers or) evaluate the project once it is completed.[8] The system of patronage thus carries within it the genetic[9] code for the system of evaluation. We shall illustrate this with a couple of simple examples.

Case I is that of a NARS where funds are allocated at the national level to major areas of research: say, plant breeding and genetics, agronomy, soil-sciences and water technology, animal husbandry, animal genetics, veterinary medicine etc., by broad areas. Within each area, the existing research institutes compete for research funds by submitting research projects under each or any of the areas in which the scientists have professional expertise. Here, previous evaluations of the institute, its research programmes and projects play a crucial role in helping the nodes make decisions regarding fund allocation levels, durations etc. Periodic and thorough evaluations are then a necessary condition for the mere survival of the research institute. Case II is that of a NARS where there are designated block grants available to all research institutes to conduct research within their designated research remits. Here, the nodes at the national level have no major decisions to make, other than perhaps curtailing or augmenting the funds and other facilities granted to institute A or institute B; the previous performance of the institute is not a criterion for current funding decisions. In such cases the nodes within the institute may be responsible for allocating funds to specific programmes or projects; the level of specialized knowledge or capabilities required to aid these decisions is either available within the institute or within a select circle of peers whom the institute can mobilize. Here, previous project evaluations and personnel evaluation records are important in increasing the allocative efficiency of the node. But these are not absolutely critical to the survival of the institute; it is assured funds in the future, often irrespective of its performance, through regularized block grants. The institute may, for instance, maintain strictly financial and administrative nodes and continue to support programmes with little or no assessment of previous research or estimation of expected impact of future research projects. A precedence or congruence approach[10] is followed in scientific and technical decisions, with regular assessments of financial and administrative performances. Besides these, Case I and Case II also highlight major differences, in the type of evaluation tools employed and in the clients for their evaluations. We would argue that understanding nodes – the points of delegation with significant powers of discretion – and their behaviour is the key to our understanding of the agricultural science establishment.

> Identifying the problem of science policy as a problem of delegation allows the analyst clear access to important normative questions about accountability in research and

research administration, pluralism in research funding, federalism in the organization of research sponsorship, and autonomy of researchers and research institutions. (Guston, 1996: 232)

2.2 Scientists in and as Nodes: Evaluation Roles and Functions

Every system of patronage comes with its own code for evaluation of scientific research, justified by the expectations of the patron and manifest at the nodal points of delegation, which resolve the uncheckability problem. We contend that changes in patronage relationships have brought about corresponding changes in the evaluation of agricultural research in India.

It is essential to place two relevant points in perspective:

(a) there exists an intricate linkage between various types of evaluation; and
(b) scientists play a vital role in evaluation as clients and as evaluators/nodes.

The particularity of the client often determines 'what' is being evaluated: the research product, the process, the personnel or the overall organization of research (Raina, 1997). Evaluation of research is undertaken for a range of clients, among whom the most prominent and powerful client is the donor/sponsor. Other clients of evaluation are the public (the ultimate tax-payers and consumers of research products), the scientists (professional/personnel assessments), the research organizations/management (achievements against expectations/terms of reference), specific sub-sectors (agri-business communities) etc., all of whom are consumers of knowledge/technology generated, be it product or process (including knowledge on research processes and managerial techniques). Each group of clients have an exclusive claim to or demand for a particular research product, which may be of little direct relevance or value to other clients. For instance, a scientific publication has a well-defined client group among agricultural and other scientists. Farmers and the private sector seed producers/fruit processors will have little to gain from research publications *per se*. Even within each group of research products the benefit or value derived from it, despite equal accessibility to all clients, will depend on other factors such as the quantity and quality of private goods consumed.

Evaluation of research products and the choice of methodology thus depends on the nature of the research product – a published paper or a new plant variety or a modification in planting methods, as well as the particularity of the client. For instance, impact assessment studies and peer reviews are evaluation tools used for different research products and client demands. A policy-maker or a farmers' association may demand impact assessment studies to justify an increase in research funding or to assess the social and private benefits of a new weeding practice. In a similar vein, scientists demand peer reviews of research papers in their efforts to seek recognition of excellence or promotion. Within a NARS, criteria of merit can be the impact of the scientists' projects on crop production or productivity, or the protection of the environment, instead of peer review comments on research publications.

The performance indicators and criteria, incentives and responsibilities, that a research organization prescribes for its research personnel reveals the mission of

the research organization (Elz, 1984). The organizational mission makes evident the evaluation objectives and performance expectations of the entire organization, research remits and mandates of individual institutes and research programmes. These are often the very subject of the terms of reference of an External Review. External Reviews or evaluation of research programmes or institutes, be they by the management of a research organization, its bureaucracy, or an external donor agency, come with an interest in organizational efficiency or effective programme implementation or utilization of research resources (material and personnel). This is attuned to the larger issue of social, economic and political impact of agricultural technology. Internal reviews/evaluations address these concerns within the prescribed mandate of the research organization. Scientists and other peers within and outside the research organization make crucial decisions about funding, continuing or winding up research programmes, research management, the autonomy of researchers and so on (Just and Huffman, 1992). Evaluations of research personnel are not just important for the career prospects of scientists, but are integral to meeting the desired technical and administrative accountabilities in a research organization.

Scientists as clients of public agricultural research may be seen as employees exhibiting typical advantage-seeking behaviour, interested only in career advancement, thereby perpetuating the research system without any social or economic accountability. However, scientists, by virtue of the knowledge they possess, are also evaluators within the research organization, as peers/experts with professional demands of technical accountability, and economic and social accountability. This is a point of convergence of capabilities and functions, of scientists as evaluators and clients of research evaluation. Figure 2 presents an illustration of the relationship, in a system of patronage, between those who wield the power of knowledge and those who wield the power of funds. In Figure 2, the left side gives the basic asset/tool used for research decision-making. The patron here makes a sub-patronage work on its behalf, often peopled by politicians, bureaucrats and leading scientists of the time.[11] This level of sub-patronage is supposed to use the resources of the State with discretion, following suitable assessments or evaluations of the NARS. In almost every NARS, this body (designated a governing body/board of directors/research advisory council to the ministry) also formulates research policies for the NARS based on their assessments of past performance, current situations and future requirements. The members of this august body are thus evaluators as well as nodes wielding enormous powers of discretion, especially in their judgements about selecting and funding research programmes. For instance, support for specific commodity research or particular promising research methods, such as resistance breeding or integrated pest management, are validated by this body. The decisions made here are validated by an evaluation of research, which in turn draws on their expertise. Further down the line, within research organizations and specific research programmes or projects, nodes or points with significant powers of discretion also draw their decision-making capacity from their scientific expertise to evaluate/assess/appraise research. Within a NARS, the senior bureaucrats/scientists at the level of sub-patronage, as well as the research managers and scientists at the nodes, perform

evaluation functions. They appraise, select and fund programmes and projects, or assess research output, performance of scientific personnel and the achievements of research institutes and their programmes. Scientists, by virtue of their expertise, are party to and participate in these nodes and evaluations, wielding the power of knowledge.

The need for, types of, and the institutionalization of evaluation in this NARS are a function of the distribution of nodes, a decision which is often made by the first sub-patron, the Governing Body. Different distributions of nodes are thus a sequential arrangement of people or groups of people, with different capabilities and functions exercising different kinds and extents of discretionary powers. For example, cases I and II above have different distributions of nodes and evaluation requirements.

Different distributions of nodes can have different effects on the research content of the organization and demand different capabilities of the nodes/evaluators who assess research at various decision-making levels within the organization. For instance, is the uncheckability problem relatively easier to resolve in Case I of competitive allocations to a wide range of research projects, than in Case II of pre-allotted block grants allocated to competing research projects within the institute (Just and Huffman, 1992)? What, in such cases, are the inter- and intra-institutional relationships of the nodes?

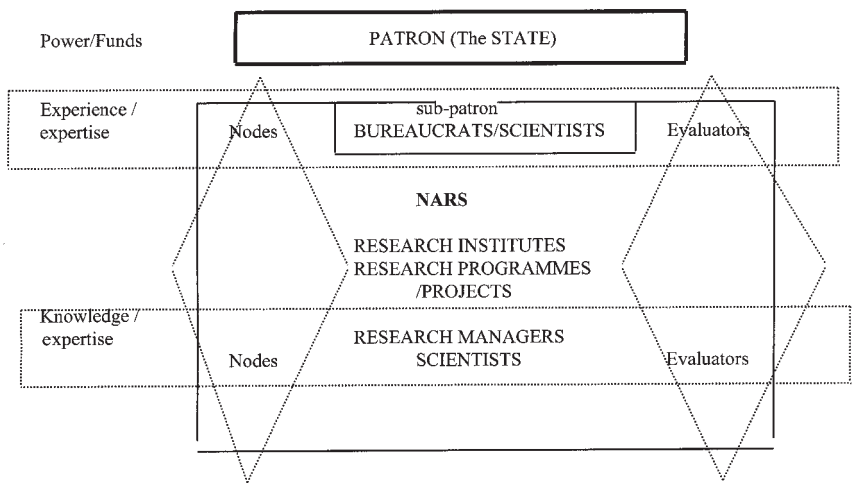

Figure 2: Mutually Permeable Relationships and Roles in a NARS

Note: The vertical and horizontal space enclosed in dotted lines indicates the range of roles and functions performed using experience/knowledge/expertise. Scientific expertise finds a place in research decision-making at all levels of the NARS, most resolutely at the institute /programme level; therefore, the illustration of wider/more intense use of nodes and evaluators at these levels. Expertise outside the NARS is also used in research decision-making.

As an analytical framework, Figure 2 gives us the nature and distribution of nodes as the main tool to explain the role of the scientist in research decision-making and evaluation. Can nodes and their evaluation functions be redistributed or reconfigured (members, procedures, and accountability at each node) to ensure maximum checkability and/or to reduce the role of trust? Trust, in the patronage of science, can range from faith in a particular approach or theory of science to unquestioning approval of assessments made by a particular sub-patron, say a senior scientist or bureaucrat. To what extent can bureaucrats make decisions in a research organization? What is the ideal distribution of nodes and the linkage between administrative and technical decision-making? Is there a clear distinction between administrative and scientific decision-making; or can scientists become technocrats and administer their own research organizations? Needless to say, changes in the expectations of the patron, the nature and capabilities of the sub-patrons, the distribution of nodes and their powers, the past as well as prevailing scientific theories, extent of specializations and the professionalization of the scientific community concerned, are major influences on the evaluation experiences of a NARS and its overall performance.

Indian agricultural research has gone through major changes in patronage, ranging historically from private planters' associations and commodity committees to public provincial research stations, national institutes and a national agricultural research council.[12] At the national level, responsibility for sub-patronage has moved from the officers of the erstwhile Imperial Department of Agriculture (1891), to the bureaucrats (Indian Agricultural Service) in the Ministry of Agriculture (1906), from there to members of the Governing Body of the Imperial Council of Agricultural Research (1929), and finally to the scientific and administrative leadership of the Department of Agricultural Research and Education (1974). There have been corresponding changes in the nature and distribution of nodes with different powers of discretion and evaluation capabilities. We will now examine the evaluation experiences of the Indian Council of Agricultural Research with reference to the changes in the nature and distribution of nodes.

3. External Evaluation of the ICAR

3.1. Organizational History

Unlike their European counterparts, public agricultural research institutes in India – in the colonies in general – did not evolve in response to pressure from agricultural scientists for state sponsorship. ICAR was organized as an Agricultural Research Council and registered as an autonomous Society in 1929, commencing service in 1930 as an attached office within the then Imperial Department of Agriculture. Research decision-making in the new autonomous Society was to be 'scientific'; but functioning as part of the Department of Agriculture. All crucial research decisions in the Council were made by bureaucrats. This pattern of decision-making became the norm, justified by the fact that the Council was sponsored by the State.

The ICAR has been through two major reorganizations; the first, in 1966, not

only expanded the size (magnitude of funds, number of institutes) and coverage (disciplines, commodities and regions) but also elevated the Council from a mere co-ordinating and funding agency to a functional research organization directly funding and implementing research in its own research institutes. From being an attached office in the Department of Agriculture, as part of the Government of India, the ICAR was transformed and given a separate bureaucratic identity – the Department of Agricultural Research and Education (DARE) in 1974. Evolution of the ICAR is marked by three distinct phases; 1929–66 being the first, 1966–74 being the second, and post-1974 the third. These phases are marked by the magnitude of research resources at its disposal and the nature and extent of public sector (Government) participation in research.[13]

3.2. Evaluation and Reorganization: Phase I

Uncertainties in resource receipts from the central government marred the mandate of the Council to co-ordinate research and support regional research through ad hoc projects. Decision-making by the three nodes in the Council, viz. the Advisory Board, Special (Commodity) Committees and Pre-determined Central Projects, indicates that the autonomy in scientific research decisions envisaged by the Royal Commission never worked. Allocation of research resources (1930–40) by the Governing Body of the ICAR was in response to immediate commercial concerns, local provincial government demands and the special interests of the Central Ministry, rather than to recommendations by the Advisory Board based on appraisal of ad hoc project proposals submitted through provincial governments (Rajeswari, 1992). After funding special projects recommended by the central government on sugar, locusts, oilseeds and manures, the Council hardly had any funds to support the schemes for co-ordination of national research as recommended by its own Advisory Board.

New funding arrangements (the Agricultural Produce Cess Fund) first institutionalized in 1940 gave the Council some research resources to allocate, based on scientific appraisal of project proposals. These funds thus gave the Council the opportunity to make its own research decisions based on scientific expertise, in contrast to the allocations made by the bureaucracy without the aid of scientific appraisals.

From 1940 till 1966, funding competitive ad hoc projects appraised and recommended by the Advisory Board node was the major activity of the Council. For evaluation of these ad hoc projects the Council had developed 'elaborate systems and procedures in the form of regular scientific staff, a system of external refereeing and a large body of senior level scientists in the form of Advisory Committees (now scientific panels) to evaluate project proposals, monitor their progress and evaluate the final results' (Acharya, 1986: 49). When reorganized in 1966, based on the recommendations by three External Review teams in 1955, 1960 and 1963, the Council was made responsible for all research institutes thus far under the central Ministry of Agriculture, the Commodity Committees, some state government research stations, and all research projects co-ordinated by and under the central government.[14]

The reorientation of agricultural research in the 1960s, with the emphasis on

applied research – plant breeding (heterosis as against the conventional pure line breeding and selection), physiology and genetics (semi-dwarf varieties and disease resistant genes), soil chemistry and agronomy (water regimes and manurial packages) – demanded a major realignment of existing institutional arrangements. Thus in 1966 the reorganization of the ICAR was a direct consequence of a deliberate change in research content, which sought to achieve a very specific impact on food production.[15] ***If research was to ensure the desired impact in terms of food production targets, a research organization providing ample incentives to scientists was imperative.*** After a detailed review of the NARS, the Review Committee (1963) appointed by the Ministry of Agriculture made recommendations that would meet two main objectives:

> creation of an incentive system that would encourage more research from professional personnel, and establishment of an organizational framework that would enable them to focus on the most urgent problems. (Ministry of Agriculture, 1964)

The most significant outcome of the External Reviews in the pre-1966 period was this cognizance and emergence of agricultural scientists as a client group which could make its own demands on the research system. Thus, the institutional reform of 1966 involving major changes in research organization was premised on the recommendation that directly linked the impact of the entire NARS to the performance of individual scientists. The evaluation system, however, remained untouched by this organizing principle.

3.3 Evaluation and Research Decision-making in the Council (Phases II and III)

It was the Review Committee (1963) that for the first time pitted the scientific community against the bureaucracy, demanding that the Council be 'scientifically' and not bureaucratically governed. After identifying several bureaucratic and procedural impediments in the implementation of previous proposals, this Committee demanded the abolition of the ICAR. In response to these demands, the Council was reorganized (with consolidation and centralization) with scientists placed at the helm, a substantial boost in research resources, and full responsibility for recruitment of its own scientific staff. What was ignored in this reorganization, the creation of an appropriate system of incentives and evaluations for professional scientific effort, continues to be the problem in the Council to date.

The terms of reference given to the IIM Review Team (Chowdhury et al., 1972) sponsored by the National Commission on Agriculture in 1971, suggests that the bureaucracy within the Central Ministry of Agriculture was aware within five years of the reorganization that 'effective' research left much to be desired in terms of effective organization, working conditions for professionals and research policies. Scientists had replaced bureaucrats at the nodes (directors of research institutes, chairpersons of personnel recruitment boards) to recruit, assess and evaluate, and promote or reward scientists, without any change worth mentioning in decision-making processes, or related institutions of accountability or responsibility for these decisions.[16] The composition and distribution of nodes had changed; but the nature of decision-making remained unaltered, as in the pre-1966 phase.

Following a crisis in personnel management, an Enquiry Committee was appointed by the government of India in 1973 and reorganization of the Council effected in 1974. At this point in the history of evaluation experiences, we find the expression of professional demands from the agricultural scientists. The Enquiry Committee (ICAR, 1973) suggested that the responsibility for recruitment be handed back to the Union Public Service Commission 'at least for another five years', since the Council was seen as doing no better than the pre-1966 years in terms of recruitment and career advancement policies (ICAR, 1973: 12). However, the scientists at the helm of the ICAR were reluctant to let go of the relative (and recently acquired) freedom from bureaucratic controls and their view prevailed. In 1975, a new agency for the recruitment of scientists, the Agricultural Scientists Recruitment Board (ASRB), was established for recruitment into the Agricultural Research Service (the ARS).[17] Agricultural scientists had succeeded (despite contrary recommendations by the Enquiry Committee) in establishing the Council as a separate department in the central Ministry of Agriculture (no longer an attached office in the Department of Agriculture), acquiring their own recruitment agency, obtaining a higher status (on a par with the Indian Administrative Service) and pay-scales for agricultural scientists and a merit-based (not post-based) system of career advancement.

Since 1975, the Director General of the ICAR, an eminent scientist (since the reorganization of 1966), has been playing the dual role of DG-ICAR and Secretary-DARE; the first and most important sub-patron. As the DG-ICAR, this sub-patron receives scientific advice and support for research decision-making from the eight Deputy Director Generals, each an expert in her/his field of specialization in the agricultural sciences. These nodes (the DG-ICAR with the Deputy DGs) make all the scientific and technical decisions in the Council. As Secretary-DARE, the bureaucracy – Joint Secretaries – on secondment from the Home and Finance Ministries help with administrative and financial decision-making. These dual decision-making roles and the separation of discretionary powers, scientific-technical versus administrative-financial, have played havoc with the evaluation system and accountabilities in the Council (ICAR, 1988; Gupta et al., 1991). Delegation of decision-making is a necessary condition to resolve the uncheckability problem (see Figure 2). In the ICAR, this dichotomy in decision-making at the headquarters (HQ) is passed on to the nodes within the Council's institutes and research programmes/projects, reducing evaluation to no more than administrative and financial controls. Several leading agricultural scientists have spoken of their problems in working within the administrative controls imposed by the headquarters, to the detriment of competent technical decision-making (Barooah, 1993). This dichotomy in the Council's headquarters, between research and the administration of research, has been the major concern in recent External Reviews of the Council; all of them have come up with more or less similar suggestions to correct this organizational anomaly.

Two External Reviews of the Council (DARE), by the G.V.K. Rao Committee (ICAR, 1988) and the IIM, Ahmadabad Team (Gupta et al., 1991), recommended effective decentralization of research, which is totally against the grain of the Council's approach to research organization right from its inception,

particularly so since the 1960s. Both reviews note serious anomalies in the Council's personnel practices and recommend a new personnel policy. Recommendations in the Biggs Report (1989) exemplify increasing professional demands from the scientific community in the ICAR. The scientists and research managers expressed their need for the consolidation of existing databases, strengthening ICAR's capacity for research policy analysis and establishment of self-sustaining information flows.[18] The World Bank study (World Bank, 1990) of the ICAR made recommendations to correct the 'mechanistic handling' of personnel in the Council. But ultimately, the important recommendations made in these reviews can be endorsed and implemented by the ICAR only if 'the scientists respond to the challenges and take advantage of the opportunities an evolving science offers' (World Bank, 1990: xvi).

4. Internal Evaluations in the Council

4.1. 'Nodes' that Evaluate Research

The External Reviews of the Council discussed above have drawn attention to the inadequate decision-support systems for scientists taking up the challenges of modern agricultural science. We would argue that a major deficiency, besides the dichotomy in decision-making discussed above, is the lack of appropriate processes and capabilities at the nodes to appraise, assess or evaluate research. The question now is whether the Council can continue with its present system of evaluation and simultaneously expect its scientists to venture into new and challenging areas of agricultural science. What are the evaluations and assessments that help decision-making within the Council's research institutes and programmes?

Table 1 gives a list of internal evaluations institutionalized in the Council. The first column, titled 'Agency', denotes the agency appointing or calling for the evaluation. Evaluators are often experts or research managers within the ICAR or experts outside the ICAR. Evaluation exercises within the Council are as much *ex ante* project appraisals as *ex post* evaluations. Table 1 outlines the convergence of capabilities and functions at the nodes within the Council and its research institutes and programmes. Does the organization of the Council permit effective and efficient discharge of these responsibilities at the nodes? Below we analyse the composition, processes of decision-making, evaluation tools and powers of discretion at each of these nodes. The nodes are taken up in the order presented in Table 1.

The evaluations initiated at the insistence of the Planning Commission are meant to assist the planning process and allocation of funds to the Council for the next Five Year Plan. The Council's Strategic Policy Planning Committee, the Strategic Policy Co-ordination and Advisory Committee, the Advisory Board and the Senior Officers' Meetings are called to service these planning decisions.

Quinquennial Review Teams (QRTs) have a broad mandate to evaluate and recommend changes in the Council's institutes. They are functionally evaluation

Table 1: Internal Evaluations Institutionalized in the ICAR*

Agency (and frequency)	*Evaluators*	*The evaluated*	*Evaluation objectives* [a]
Planning Commission (once in five years)	Steering group Working group and sub-working groups (politicians, bureaucrats, research managers/senior scientists)	ICAR/DARE (All Institutes, Projects, Education under the ICAR)	*Ex ante* appraisal of proposed Research Plan and critical review of the achievements in the previous Plan.
ICAR (HQs) (once in five years)	Quinquennial Review Teams (experts in the major areas of research mandate of the Institute)	National Institutes, Central Research Institutes, National Research Centres, Project Directorates, National Bureaux	Examine research achievements of the Institute during the past five years; examine objectives, scope and relevance of research and budget allocations for the next five years; assess research for conformity with Institute mandate; examine policies and strategies, functioning of Staff Research Council, Management Committees etc.; linkages with clients; assess need for organizational change for effective functioning; assess organization of the Institute for effective working autonomy and decentralization; examine constraints if any in the Institute; any other points considered relevant.
ICAR Institutes (annual with quarterly reviews)	Staff Research Councils (senior scientists of the Institute)	All research projects within the Institute	Review progress of ongoing projects; suggest modifications in the technical programme of ongoing projects; assess new research projects and take decisions on phasing out of projects; evaluate completed research projects.

Table 1 continued

Agency (and frequency)	*Evaluators*	*The evaluated*	*Evaluation objectives* [a]
ICAR Institutes (quarterly)	Management Committees (Director and senior scientists of the Institute, representatives from ICAR HQs, State Departments [where the Institute has major activity], SAUs, and farmers).	All research programmes and allocation of funds within the Institute	*Ex ante* appraisal of projects; monitoring of on-going projects; allocation of research resources – personnel, material and financial – to specific projects/programmes; overall management of the research and development activities in the Institute.
ICAR (HQs) Annually	Annual workshop on Co-ordinated Research Projects (ICAR HQ staff, Project co-ordinator and project scientists, experts from ICAR Institutes and SAUs).	All India Co-ordinated Research Projects (on each crop/commodity/ problem)	Evaluate the work done in the previous year in relation to work plan drawn in the previous workshop; prepare work plan for the next year; review implementation of the recommendations made by the previous workshop, MTAC[b] and other special advisory groups to advice on specific aspects of the CRP.
ICAR (HQs) Annually	Scientific panels (ADGs and experts)	All ad hoc research schemes	Process, scrutiny and sanction projects based on the (APCess) proposals submitted by individual scientists or formulated by the scientific panels; scrutiny each proposal from technical and financial angles, and on approval from finance section, sanction them with approval of the DG for funding; monitor ad hoc projects based on annual reports; evaluate ad hoc projects based on final reports on termination of the projects.

Table 1 continued

Agency (and frequency)	*Evaluators*	*The evaluated*	*Evaluation objectives* [a]
ICAR (HQs) periodic as required	Expert Teams Scientific Panels Ministry of Agriculture Screening Committee (experts involving those from cooperating country, members of donor agencies, ICAR HQs, members of Agriculture, Finance, Department of Economics Affairs, and US experts)	Foreign aided projects and US PL480 schemes	Initial appraisal and security and sensitivity clearance of the project; monitoring of project based on annual reports; evaluation of projects based on final reports.
ICAR Institutes (by duration of each scientist's project[s])	Peers /Experts Heads of Division/Directors	Research personnel	Assess project-wise personnel performance based on Research Project Files.

Source: Adapted from Acharya (1986), Randhawa (1987) and ICAR (1988).

* External Reviews are not included; the institutional response to these review recommendations was discussed in Section 3.2.

[a] As on paper in the terms of reference specified for these evaluators; all these are not necessarily done in practice.

[b]MTAC, the Mid Term Appraisal Committee, is constituted by the ICAR(CRP) HQs, comprising a Chairman and 5–6 members drawn from outside the ICAR system, to appraise and evaluate from time to time the CRPs.

teams, who by virtue of the powers of discretion and a convergence of multiple capabilities and functions, are nodes – a group of selected experts for research decision-making based on an assessment of the institute's work over the past decade. These are nodes constituted by the ICAR headquarters by bringing together three parties: the Institute concerned; the ICAR headquarters; and 5–6 external experts. They are the most important of all the evaluation teams in the ICAR. They are intended to serve both the ICAR headquarters and the ICAR institutes concerned in appraising each other and in effectively co-ordinating the national research effort, but it appears that the QRTs are afflicted by the same bureaucratic difficulties that have been observed in the intra-Institute reviews/appraisals (World Bank, 1990).

The QRT is supposed to evaluate the Institute's research programmes for effective implementation, efficiency and impact, but efficiency and impact are never really assessed. What makes the QRTs almost redundant in the ICAR is the fact the ICAR headquarters do not respond to the recommendations or suggestions made in the QRT report (Gupta et al., 1991: 26).[19]

The Staff Research Councils (SRC) meet more regularly than ICAR Institute Management Committees but the time spent assessing projects is short. On average, an SRC in an ICAR Institute evaluates 35 projects a day, giving it hardly any time for evaluation of any one project (Gupta et al., 1991: 27). Though the participation of scientists is essential for the successful evaluation of projects, their participation is limited; the participation of external experts is scarce too (Gupta et al., 1991: 27). In effect, the SRC as nodes within the institutes are in no position to make a proper appraisal or evaluation of the research projects.

Within the research institutes, *the Management Committee* ***is the most important node*** helping the director of the institute in research and administrative decision-making. These Committees were constituted in the ICAR institutes following the recommendations of the ICAR Enquiry Committee (1973), to decentralize decision-making in the institutes with adequate representation of the research system and its clients. But to date, the Management Committees only recommend and have not been given any evaluation responsibility other than to appraise units for new and current projects. Moreover, the Management Committees hardly meet, and then only irregularly for a very short time (Acharya, 1986: 44). These Committees endowed with little or no powers of discretion hardly qualify to be designated nodes.

The Mid-Term Appraisal Committees (MTAC) on Co-ordinated Research Projects have no lack of time; they take on average more than three years to review one Co-ordinated Research Project (Acharya, 1986: 32). Though intended to be an internally initiated assessment, the MTAC is meant to advise the project with appropriate external expertise. In practice, the MTAC is most often headed by the Project Co-ordinator as member secretary, thereby providing scope for bias in evaluation and rendering the MTAC redundant to the modification of the Project. There is no regular period for review of the Co-ordinated Research Project; mid-term may range anywhere between 5 and 26 years. The annual

workshop on Co-ordinated Research Projects seems to be the forum where some evaluation of the CRPs is attempted (see Table 1).

Ad hoc and PL480 projects are appraised, monitored and evaluated by external referees and scientific panels constituted by the ICAR (HQs). These competitively funded projects seem to receive the best evaluation inputs from the ICAR.

Within an Institute, the same team of decision-makers are requested to use methods such as impact assessments and project appraisals, and to make judgements on the allocations to projects or termination of projects; little is known about the capacity of these decision-makers to make these judgements. However it might be noted that there are hardly any social science or economic inputs that feed into these evaluation exercises. Nor is there much evidence to show how the various evaluation experiences relate to each other and to the ultimate mandate or mission of the institute or the Council.

4.2. Nodes and the Assessment of Scientific Expertise

The Agricultural Scientists Recruitment Board (ASRB) sought to remedy the problems in a post-centred organization by creating a scientist-centred one, where merit was the key to career advancement. The Agricultural Research Service (ARS) was intended to:

> permit young scientists entering a research career to get the highest salary possible without changing his/her field of specialization and without shifting to managerial administrative posts merely to receive a better salary. (Randhawa, 1987: 123)

The success of the new ARS (1976), to which professionals were appointed by the ASRB, depended on an integrated system of evaluations and assessments: (a) the evaluation of scientists under the Five-Yearly Assessments (FYAs); (b) the monitoring and evaluation of research projects throughout and at the end of the project term using Research Project Files (RPFs) and administrative records; (c) the evaluation and re-assessment of the research programme and Institute performance; and (d) planning and monitoring the research mandate and requirements of the Institute. A system of Five-Yearly Assessments (FYAs), with a 'peer review system' and a 'point system' of assessment, was introduced for personnel evaluation. In the point system, 'maximum weightage was given to scientific achievements as evidenced through publications, reports, etc.' (Randhawa, 1987: 132). The practice of maintaining an RPF, with entries of duties assigned, performed, and problems or constraints faced in the assignment, was commenced.

ICAR institutes still maintain Research Project Files but these RPFs do not help in personnel evaluation or the evaluation of projects because the RPF format does not define goals/expected results, plan of action or procedures, time schedules, and specific work assigned to each individual in the project. Promotions or increments are awarded, based solely on publications and the Annual Assessment Reports and the FYAs. But the assessment of merit loses meaning when almost all the scientists in the Council are granted promotions. This in turn frustrates work that is of real merit. About 90 per cent of the scientists who underwent assessments in 1985 were either given promotions or increments (Randhawa, 1987: 133).

Following the pay revisions in 1986, the entire pattern of evaluation, promotions and incentives within the ARS has been re-constituted, with career advancement based on number of service-years (8 or 16 depending on cadre), and the number of senior vacancies available.[20] This change in incentives and promotions was introduced for the sake of an increase in salary; personnel morale in the Council is now judged to be very low.

Our overview of internal reviews reveals a disjointed set of evaluations; there is no mechanism to ensure that the various internal evaluations draw on each other and sustain an effective institutional reform mechanism within the Council. The personnel assessments do not feed into project or programme reviews; the latter do not interact for iterative corrections or modifications with the SRCs or Management Committees in the institutes. Personnel assessments and career advancements are almost entirely (except for the internal annual assessments) outside the powers of discretion of the intra-institute nodes – the Project Leaders, Heads of Divisions, SRCs and even the Director. Personnel and programme reviews are handled by nodes/evaluators outside the Institute; different masters demanding different performance measures and accountabilities. Personnel and programme performances in the Council's institutes are not linked to the impact of the research effort, of the institutes or of the Council, on Indian agriculture.

Is this indicative of the need for vision, **or a separate evaluation unit within the Council?** Perhaps institutionalizing an integrated evaluation system within a separate evaluation unit might help ensure stringent evaluation of research. This overview of internal reviews highlights the need for a unifying integrated vision of evaluation in the Council. But the basic question of the nature of nodes, i.e. their responsibility mandate, activities, outputs and how results are taken up, must be addressed before any institutional reform in evaluation can help research.

4.3. Impact Assessment: Power without Accountability

Impact assessments in Indian agricultural research have been relatively few. All these have been academically motivated and have concentrated exclusively on production impacts.[21] Estimates of returns to investment in research constitute the bulk of these studies. Economic and social impacts of green revolution technology have also been estimated (see Prahladachar, 1983; UNRISD, 1974).

Within the Council, impact assessment is yet to be used as an evaluation tool, though it is an essential component of the evaluation system. By their terms of reference, the Working Groups of the Planning Commission, the QRTs, as well as the intra-institute nodes such as the Staff Research Councils and Project Leaders, and the Management Committees, are to assess the various research institutes, or projects for their impact (see Table 1 above). The scientific panels and CRP workshops are meant to do the same for the ad hoc research schemes and the CRPs. **But none of the possible impact assessment studies are actually performed.**[22] Moreover, little has been done to assess the institutional impact of research, though this has been a significant impact of scientific research in India (Lele and Goldsmith, 1989).

The 'usual problems with impact assessments' apply to the ICAR too (Horton et al., 1993: 103). First, the Council lacks personnel and funds, and the long-term planning and time required for proper impact assessment studies. Second, the

Council has internalized a bureaucratic norm of assessing research for effective implementation of project objectives and the technical programme, basically its financial and administrative components. Efficiency and impact of research are not central concerns in evaluation (Acharya, 1986). This apathy towards impact of research is also a consequence of the organizational dichotomy within the Council, between technical and administrative sections.

The immutable bureaucratic nature of nodes has perpetuated itself ever since the inception of the Council. As is typical of bureaucracies, the nodes have always been endowed with power without accountability. If the nodes were made accountable for the performance of personnel, projects and institutes, would they press for appropriate organizational changes? Assuming that they did, are these immediate sub-patrons and nodes equipped to handle evaluation tools and methods? Our analysis suggests that research managers and scientists within the Council, as well as the experts the Council invites for research evaluation, are often found lacking in time and evaluation techniques, as well as in essential scientific and managerial information inputs that allow effective evaluation of scientific research to take place.

5. Conclusion

The marginalization of evaluation of research in the ICAR is evident. In conclusion we highlight how the social reproduction of nodes perpetuates this marginalization. In organization terms reproduction 'is a dynamic concept, emphasizing historical continuity during periods of transition' (Wolch and Dear, 1989: 5). The process of social reproduction allows for 'the replacement or transformation of things' and maintains the fundamental relationships that characterize the production process. The case of the ICAR shows that scientific research, a social production process, may go through phases of abrupt or gradual changes. But these changes always reproduce, without fail, the same social relations that marked scientific research in the pre-transformation phase. The immutability of nodes and the decision-making processes has, in the ICAR, defined the relations of production that govern agricultural research and knowledge or technology generation.

To maintain nodes that are not scientifically or technically accountable for the decisions they make, it is essential that **evaluation** remain **marginal in the Council**. **An effective evaluation system** would demand that the nodes (individuals or groups) be responsible for their decisions. Through every reorganization, the ICAR has managed to retain the continuity of bureaucratic nodes which propels its production of agricultural technology.

Nodes by definition are points of sub-patronage where the tensions between the distribution of discretion and the distribution of knowledge are resolved. The role of the nodes starts from accountability to the ultimate patron, the tax-payer, in planning and executing the national research effort and delivering the best possible combination of a range of technologies and advances in knowledge. This accountability also extends down to individual scientists or projects in appraising, implementing, monitoring, and evaluating their research (not limited to administrative or financial accounting). The Council's system of patronage, its nodes, relies on a weak and disjointed set of evaluations to carry this considerable accountability.

In the Council, despite the continuous tension between the scientific and bureaucratic imperatives, the dominance of the bureaucracy has not enabled institutionalization of stringent research evaluation and thereby of scientific authority and accountability. The fact that agricultural scientists are not demanding more stringent evaluation is in itself proof of the pudding; only bureaucratic authority holds sway in the Council. Stringent evaluation can replace this with scientific authority and accountability; and we would argue that expertise, and not administrative norms, should be the basis for research decision-making. Increasing professional demands from the agricultural science community bringing more stringent evaluations in its wake, could bring fundamental changes in the production and use of knowledge and technology in the agricultural sector in India.

Notes

1. See for instance, Ruttan (1982), Rockefeller Foundation (1982), Lipman-Blumen (1987).
2. Discussions on issues and cases, based on the papers presented in the session on 'Evaluation of Agricultural Research: Regional Perspectives' at the International Evaluation Conference '95, held in Vancouver, 1–5 November, 1995. Also see discussion in Section 8, in Elz (1984).
3. Even the establishment of the SAUs by the State Governments under State Legislation was based on the ICAR Model Act (1966) which came in the wake of the reorganization of the Council (Rajeswari, 1992: Ch. 7 and Busch, 1988).
4. System of patronage does not, here, refer to the public-private categorization but refers specifically to the nature of funding of research, including decision-making and the processes thereof.
5. Funds are given by individual patrons, who possess discretion over their own money, to individual scientists, who lack money, for purposes that the patrons cannot fully understand, to be spent for reasons that the patrons cannot fully assess. To give here is to trust (Turner, 1990: 188).
6. In Guston's (1996) principal–agent framework for science policy analysis, monitoring and evaluation help to tackle the two main problems in delegation, i.e. adverse selection and moral hazard.
7. An attempt at a typology of nodes would be an interesting exercise. This article is limited to understanding evaluation of agricultural science and the research decision-making capacity of nodes, derived from scientific and technical expertise of the agricultural scientist(s).
8. See again, Guston (1996) on the fuzzy boundaries and interactions between the principal and the agent, the non-scientist (administrator/decision-maker) and the scientist.
9. Genetic, as used here, signifies a 'detailed causal explanation involving the interactions of component units of a system', which is what it did mean before the term was appropriated by biology (Hodgson, 1993: 40).
10. Annual allocations, made with minor changes from those of previous years, without the support of any economic rationale or major changes are based on a simple precedence. Congruence demands the use of some economic rationale in the allocation of research resources; an approximate share of resources are allocated to each commodity/crop, in proportion to their share in the economy (agricultural value added/GDP). See Ruttan, 1982.
11. 'Grants of discretion that allow someone who is patronized to patronize others in turn' . . . are called 'sub-patronage' relationships (Turner, 1990: 199).
12. No order of evolution is implied here. UPASI, the private planters association which

leads plantation crops research in South India, co-exists with the CPCRI under the ICAR and several research stations under the State Governments, which constitute the public sector counterpart. Evolution of agricultural research in India is discussed in my PhD dissertation. See Rajeswari (1992), Chapters 5 and 6.

13. See Trigo (1987) for the criteria to delineate phases in the evolution of a research organization, and Rajeswari (1992, 1995) for application of the same to the ICAR and the Indian NARS.
14. The First Joint Indo-American Team was constituted in 1954 following the Technical Cooperation Mission (TCM) agreement between the USA and India. Following bureaucratic inertia and non-implementation of the recommendations made by the First Team, the need to organize, support and co-ordinate research 'to ensure maximum efficiency' prompted the appointment of a Second Team in 1959 (ICAR, 1960: 3). The findings of the Second Team correspond to those made by the First Team. Both asked for full integration of all existing research institutes if research was to be effective. 'Effective' research in the 1960s was one that would generate the technology needed to substantially increase domestic food production – food being wheat and rice. The Third Team, led by Marion Parker, marked the emergence of agricultural scientists as a client group which could make its own demands on the research system.
15. Dr M. S. Swaminathan 'stressed that unless we shift to dwarf wheat breeding programme, it will not be possible to get full benefit from the fertilizer and water components of the package programme introduced under the IADP' (Randhawa, 1986: 368; Swaminathan, 1969; Sivaraman, 1991: Ch. 10).
16. For a different perspectives in the 'control of science by scientists', see Turner (1990), Just and Huffman (1992), and for the case of Indian agricultural scientists/technocrats, Barooah (1993).
17. The ARS recruited scientists based on their performance in a competitive written examination and interview. The service intended:
    i. to foster cooperation in the place of unhealthy competition;
    ii. to enable scientists to get the highest salary possible within the system while remaining rooted in their respective disciplines/fields, thereby eliminating both the undue importance attached in the past to research management posts and the quest for such positions purely for advancement of salary;
    iii. to promote an outlook where solving a specific field problem through inter-disciplinary team work is regarded as the primary goal of research rather than the worship of a discipline or publication of papers;
    iv. to promote horizontal and vertical mobility; and adequate attention to neglected and backward areas; and
    v. to link rights and responsibilities, and instill through the five-year assessment system the conviction that dedicated and efficient discharge of responsibilities alone would be the means of securing professional advancement (Randhawa, 1987: 123–4).
18. The sub-projects recommended in the Biggs Report (1989) explicitly state why the ICAR (and the NARS as a whole) need an effective Management Information System, and how the scientific community hopes to benefit professionally from its (MIS) inputs. The MIS or a 'relational data base management programme' can serve as an effective tool for research evaluation (Elliott, 1987).
19. For similar experiences with the evaluations by UNDP, see Elzinga (1996).
20. Ref: ICAR, Letter No.1–14/87–Per.IV, dated 9.3.89 – intimating that the UGC pay package has been extended to the ICAR scientists with effect from 1.1.86. The practice of Five-Yearly Assessment under the flexible complementing scheme was ended with effect from that date (1.1.86). The last five-yearly assessment was the one done up to

31.12.85. Ref: para 16 of letter above, or ICAR, Letter No.4–1/90–AU, dated 20.12.90 from the Director (Personnel), ICAR.

21. Horton (1990) classifies impact assessment studies into production impacts and institutional impacts.
22. Impact can be assessed through adoption studies, economic returns estimates, social and environmental impact assessments (see Horton et al., 1993: 102–3).

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