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Improving the Cost-Effectiveness of Research Investment: Linking Universities in Agricultural Research

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Abstract

The benefits of linking education and research need to become more widely recognized. This includes ensuring effective formation of an ongoing human resource as an integral part of a National Agricultural Research System (NARS). Linking universities and NARS provides a cost-effective means to increase the quality and relevance of graduate training and university research.

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Background to the Study

Re-establishing the Links

We know that effective agricultural knowledge systems link research providers to users. Yet commonly in less developed countries, universities operate independently from national research bodies and are seen, at best, as marginally relevant to the NARS and of little direct benefit to the private sector. At the same time, NARS are often unable to attract young qualified researchers trained in research techniques in priority program areas. The experiences of more developed countries (MDCs) in reducing the impact of multiple institutions to include universities in NARS provides approaches relevant to less developed countries (LDCs).

Projects Designed to strengthen NARS require:

I. Private sector involvement to ensure relevance and contribute to inputs
ii. Motivated and capable researchers
iii. Orientation of universities to national agendas
iv. Management of human resources from formative through career planning phases

This paper relates mechanisms by which universities and the private sector can be involved in NARS to the benefit of all parties. Important NARS actions for universities include the production of new researchers and the aligning of university research with industry and national needs. Means by which shifts of the behavior of universities have been successfully introduced in some MDCs are included in Box 1:

Box 1

i. Industry funded scholarships;
ii. Industry advisory groups for joint university - line agency research planning;
iii. Joint appointments for research in line agencies and universities and for research training in universities;
iv. Formation of industry groups to jointly plan research, education and extension between university and line agency staff;
v. Applied research funds independent of both line agency and university funds which are specific to assessed needs, and
vi. Provision of clear career paths to researchers, not necessarily through tenured appointments.

Motivated and Capable Researchers

Researchers working in well managed institutions are central to active and efficient agricultural research systems NARS management needs to be able to view agricultural universities as a major source of new personnel for NARS and as a pool of contract researchers through faculty and graduate students. Confused signals arising from the so called Institutionally Separated model (Falvey, 1995) common in LDCs contrast strongly with widespread reasserting of the need to link research, education and extension as an integrated continuum (Meyer, 1995). In the separated model, universities are engaged primarily in teaching and research to the exclusion of extension activities. To ensure a dynamic NARS,

appropriate research and development (extension) planning with agreed programs and objectives must be specified in order to elicit consistent responses from universities.

Relevance in Universities

We all hear that universities in LDCs are often viewed as being of marginal relevance with outdated courses and staff-directed research agendas. NARS need top agricultural and other scientists as researchers - while we must recognize that most students enrolled in agricultural universities will pursue careers other than research, the education or training of these researchers is a critical function of universities. Projects supporting NARS need to foster that small proportion of students who demonstrate an interest in and an aptitude for research to focus research training on relevant fields and to gain formative experiences with practical researchers.

Approaches to graduate training vary between research and course-work based programs. Both produce sound researchers and it is not recommended that projects seek to change existing curricula in universities serving the agricultural research sector. However, aligning research activities of graduate students with the priorities established during the design of projects which support NARS contrasts with the traditional professorial selection of research topics to complement a professor's own research interests. In an applied area of science such as agriculture, it is appropriate that university staff research reflects applied and strategic research interests which overlap, even if not fully, with those of the designated research line agency. Funding allocations aligned to agreed priorities with active industry input can accelerate such realignment. Such requirements may be further assisted through the inclusion of Human Resource Development Plans for research and development in projects in project designs.

Questions of Project Designers

The questions which commonly face project design teams concerned with educational aspects of agricultural research projects may be paraphrased as:

i. What mechanisms can be readily built into the project to foster greater interaction and collaboration between the line research agency and universities?
ii. How can the system be assured of a continuing supply of motivated young researchers beyond the financing period?
iii. How can the project maintain relevance to industry's needs and ensure that young researchers emerging from universities are skilled in those fields considered to important to industry?
iv. Should the project focus on one or several universities and should it consider faculties and universities other than those based specifically on agriculture?
v. How can client countries optimize the involvement of universities from more developed countries?
vi. How can NARS optimize the performance of their staff?

Some examples of the approaches used in Australia, New Zealand and the USA are presented in Box 2.

Box 2
Mechanisms for Improved Researcher Training
Australia: Specific research levies funded through commodity sale check-offs and matched by government are managed by a Research and Development Corporation (RDCs) with strong industry representation. RDCs invite researchers and post-graduate scholarship applications consistent with determined needs. Line funding of research agencies such as government Departments of Agriculture and universities has been reduced such that the marginal operational funding received through RDCs is able to significantly influence research which tends to be increasingly oriented to the needs of the clients. Within universities, a refocussing on the relevance to clients is beginning with joint appointments between universities and Departments of Agriculture, industry and in some cases, RDCs.

New Zealand: Far reaching institutional changes over recent years have introduced a research system based on Crown Research Institutes CRis) and universities which is competitive for public-good research (through the Foundation for Research, Science and Technology) and for specific commodity or industry areas. Scholarships are tied to agreed national and regional priorities and researchers are trained to suit that environment. Such training acknowledges the existence of high-level core research skills which are transferable to new research areas as needs change. Universities do not set their own research agenda entirely and compete openly for all government and levy funded research and scholarships. Joint appoinunents between research agencies and universities occur through the linking of universities into CRI activities.

United States of America: The Land Grant University (LGUs) system of the USA has evolved to allow the institutional integration of separate funding streams for research, education and extension. Industry involvement in allocation decisions of the LGUs maintains an applied focus in research and teaching, and in the case of post graduate courses assists programs to focus on current issues of local importance to which the application of scientific research may yield both training and industry benefits. Industry funding of research, scholarships and positions in universities are used to varying extents across the LGU system. In some LGUs there is a stated need for additional scholarships especially industry funded scholarships while in other cases, a response to declining research career opportunities appears to be a decline in the number of post graduates enrolled.

Options
The options available to NAR project design teams include the following:
Joint appointments of research staff between universities and research line agencies- positions funded externally or by the two organizations concerned which have responsibility to both organizations in a field of agreed mutual importance. Such positions may be appropriate in circumstances in which a key research field requires both ongoing research and the production of a stream of future researchers.

Industry levy or other funding mechanisms, matched by government, which are reliable and long term for commissioning of required research- such funds provide a mechanism

independent of the agencies engaged in research and education for research and so remove a possible bias in the selection of research programs of both researchers and research students. They also provide an effective means to maintain industry commitment to efficient allocation of government funds and to maintaining research relevancy. Scholarship programs for high performing graduate research students which specify priority research fields- such scholarships share th~ benefits of independence of the industry funded research and also allow significant control over the area of research study for top students. Scholarships may include a guarantee of employment by the line research agency in situations where the problem of poorly defined career paths exists.

Make competitive funds for research, scholarships and joint appointments (where applicable) open for all universities with capacity to serve agriculture- as agriculture and agricultural research require more sophisticated skills, it is no longer feasible to access all resources from single institutions or types of institutions. Agricultural faculties and universities will continue to provide the majority of integrating disciplines and applied field and much strategic research. However, other faculties also contain expertise important to agriculture in such fields as molecular biology, microbiology, biochemistry and botany, to name some.

Joint supervision of research students by university and line agency staff-research students gain from exposure to line agency staff and hence the real world of agricultural research as do university staff and the research topics selected will be better focused on applied field problems. Involvement of universities in initial NAR project design- universities form a critical component in all countries with active NARS and as such should be included in the initial design of projects. This allows consideration of the benefits of incorporating mechanisms to stimulate redirection of university activities, producing future competent and relevant researchers and expanding the pool of active researchers in the NARS.

Selective use of foreign universities-past concerns of the cost and retention rates of researchers educated in more developed countries may be reduced by strategic employment of the key skills required from foreign universities. By specifying the objectives of the investment, it is possible to select the inputs required which may take such forms as joint research student supervision between line agency, local university and foreign university staff, sandwich courses of foreign institutions which allow field work to be based on a priority research area in the home country of the researcher concerned and selective recruitment of skilled university personnel to local universities for specific programs as part of the overall technical assistance supporting the NAR project.

Ensure adequacy of core funding for the maintenance of the university human resource-there *are few matters of greater importance to the future of the university than the quality, dedication, motivation and productivity of academic staff* (OECD, I 987). Investment in NARS should acknowledge such a critical role and consider supplementary investment for key institutions. The commonly held view that the USA Land Grant Colleges provide the best model to integrate research, education and extension may not be relevant to situations where different

institutional arrangements exist and the conditions which fostered the establishment of the colleges (World Bank, 1992) cannot be readily duplicated.

Management of NARS Human Resources

A frequently overlooked aspect of NARS management is the management of human resources (HRM). Considerable effort is invested in designing advanced training programs for research staff and in supervising their academic programs without realizing the full potential of trained staff. NARS require systematic human resource management to link needed skilled researchers with compatible assignments, provide incentives for high grade performance, create opportunities for intellectual growth, and offer promotion based on fair and transparent merit criteria.

NARS need HRD/ HRM capacity and project preparation and design should analyze existing capability and the need for improvement. The essential HRD/HRM elements to be considered are in Box 3.

Box 3

i. Skill mix identification based on future research priorities
ii. Accurate job descriptions for use in hiring new personnel
iii. Selection of staff for particular research assignments based on competence
iv. Ability to conduct training needs assessments
v. Ability to plan and manage in-service training programs
vi. Capacity to evaluate the impact of in-service training
vii. Willingness of managers to reward, within limitations, superior performance
viii. Provision of opportunities for intellectual growth (attachments, sabbaticals)
ix. Fairness and transparency in merit-based promotions

NARS should be encouraged to appoint a suitably qualified person to take responsibility for promoting HRD in the system. One senior person at a central facility may be able to manage HRD on behalf of management by working with part time trained staff at each decentralized station or substation. It is essential that HRD capacity be visible and located at a level in the institution where it has the support of higher management. Project preparation should assess the ease/difficulty of affecting structural change to accommodate an HRD unit or cell or to expand an existing structural entity to take responsibility for the function.

All managers are responsible for HRM and projects should include provision for manager level workshops to clarify concepts, define responsibilities, and develop skills. Managers' job descriptions need to reflect HRM as part of expected responsibilities. In service training in NARS should be continuous and include both formal and nonformal activities. Project training components need to describe programs which make use of NARS staff and visitors in structured and spontaneous seminars, workshops, tea break presentations, and demonstrations. In service training and interaction with the greater research community can be further enhanced by use of media such as video and the Internet. Project design should examine the possible place of media in enhancing institutional capacity.

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