WORKING PAPER NO. 18 PN-ABB-576

# HUMAN RESOURCE MANAGEMENT FOR NATIONAL AGRICULTURAL RESEARCH: LESSONS FROM ISNAR'S EXPERIENCE

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November 1988

International Service for National Agricultural Research

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## CONTENTS


1. INTRODUCTION 1

2. ISNAR'S EXPERIENCE 1
   2.1 Overview 1

3. LESSONS FROM EXPERIENCE 6
   3.1 Planning 6
   3.2 Training 10
   3.3 General 13

4. CONCLUSION 16

NOTES 18

TABLES AND FIGURES

Table 1: NARS Assisted by ISNAR in Human Resource Management 2

Table 2: HRM Areas Reviewed by ISNAR: By Country 4

Table 3: ISNAR's Activities in Human Resource Management, 1981-88 7

Figure 1: The Human Resource Management System: Interactions 15

ANNEXES

Annex 1: Examples of Manpower Planning Approaches used by ISNAR 19

Annex 2: Human Resource Management: ISNAR Reviews and Follow-up Action 20

# Human Resource Management for National Agricultural Research: Lessons from ISNAR's Experience

by

Paramjit S. Sachdeva*

## 1. INTRODUCTION

This paper briefly reviews ISNAR's experience in helping national agricultural research systems (NARS) better manage their human resources and identifies key lessons from that experience. It presumes that ISNAR's cross-national experience can provide important lessons for individual NARS. The intended audience is senior NARS managers in developing countries. The purpose is to enable these managers to step back from the details of their own experience and to gain an overview of and perspective on some key human resource management (HRM) principles and their applicability to NARS.

The paper is divided into three parts: (i) overview and highlights of ISNAR's experience by major HRM area, (ii) lessons from this experience, and (iii) conclusion.

## 2. ISNAR'S EXPERIENCE

### 2.1 Overview

Since 1981, ISNAR has assisted 37 countries better manage their agricultural researchers. The regional distribution of ISNAR's HRM work has been as follows: 16 countries in sub-Saharan Africa, eight countries in Asia, eight countries in Latin America and the Caribbean, and five countries in Western Asia and Northern Africa (WANA). In more than 25 of these countries, the initial diagnostic reviews by ISNAR were conducted between 1982 and 1984, and most NARS have had follow-up planning reviews since then, sometimes by HRM specialists.[1]

In keeping with its global mandate, ISNAR has assisted NARS of various sizes. To date, the distribution of HRM activities has been as follows (see table 1 for countries covered): six countries with less than 30 researchers, nine with 30 to 100 researchers, nine with 100 to 200 researchers, seven with 200 to 500 researchers, and six countries with 1,000 to 3,000 researchers. ISNAR has thus covered over 13,000 researchers (excluding expatriates). This constitutes roughly 30 percent of the 45,000 agricultural researchers in the 129 developing countries included in ISNAR's global data base.[2]

ISNAR thus has experience helping a fairly large and representative sample of NARS -- with countries varying in size and thus in organizational complexity and program diversity, as well as in geographical location, administrative culture, and historical tradition.

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Assistance provided by Bonnie Folger and comments received from Byron Hook and Paul Bennell are gratefully acknowledged.

Table 1

## NARS Assisted by ISNAR in Human Resource Management

| NUMBER OF * RESEARCHERS | COUNTRIES |
|---|---|
| 0-30 | Fiji, Niger, Papua New Guinea, Rwanda, Somalia, Western Samoa |
| 30-100 | Burkina Faso, Gambia, Guyana, Ivory Coast, Jordan, Madagascar, Malawi, Uruguay, Zaire |
| 100-200 | Cameroon, Costa Rica, Dominican Republic, Ethiopia, Senegal, Sudan, Tunisia, Uganda, Zimbabwe |
| 200-500 | Colombia, Ecuador, Kenya, Morocco, Peru, Sri Lanka, Syria |
| 500-1000 | ------ |
| 1000-3000 | Argentina, Bangladesh, Indonesia, Nigeria, Pakistan, Thailand |
| TOTAL: 13,000 | 37 Countries |

* Full-time equivalent units, 1980-85 averages excluding expatriates.
Source: Adapted from ISNAR Data Base (1988) preliminary figures.

Because of their relatively large size, the Asian NARS account for over 57% of researchers covered by ISNAR's work in HRM. However, the majority (51%) of countries assisted by ISNAR have been in Africa. Most of these countries have less than 200 researchers each and together account for almost 28% of the researchers covered.

The HRM areas reviewed by ISNAR, both as part of a general NARS review and by specialist missions, are tabulated in table 2 by country. In almost all countries, aspects of manpower planning and training have been covered, though to varying degrees. Compensation-related issues have been examined in over 20 countries but have been studied in detail only in eight NARS. Appraisal systems and performance improvement measures have less frequently been examined in depth. ISNAR's work in human resource information systems dates back only a few years, and primarily covers a handful of countries in Asia.

Manpower planning has been undertaken for such countries as Bangladesh, Cameroon, Dominican Republic, Ethiopia, Kenya, Sri Lanka, Thailand, and Zimbabwe. In these and other countries, the unique circumstances of the NARS and the specifics of its request for assistance have largely determined the nature of analysis undertaken, the methodology used, the recommendations made, and the follow-up action taken. The diversity of approaches used by ISNAR is illustrated in annex 1 by a few examples.

In a number of countries, ISNAR has helped identify training needs (by commodity or disciplinary research programs) and has helped determine the mix and level (PhD, MSc) of specializations needed. In some countries (Argentina, Cameroon, Dominican Republic, Ethiopia, Kenya, Sri Lanka, and Zimbabwe) detailed 5- to 10-year training plans have been prepared as a logical follow-up of long-term manpower planning.

ISNAR also has experience in compensation-related issues in NARS. Advisory work has been done in Argentina, Cameroon, Colombia, Kenya, Sri Lanka, Thailand, Uruguay, and Zimbabwe. Selected aspects have also been reviewed in Indonesia, Somalia, Tunisia, and Zaire, among others (see table 2).

In many of these countries, the conditions of service of researchers have been reviewed in detail, with attention given to such items as grade structures, personnel costs as a proportion of the recurrent budget, salary differentials between scientist categories and managers, external parity with university-based researchers, shape of the present and anticipated salary profiles, relationship between salary, age, and years of service, and (financial) incentives for performance. The relationship between performance and rewards (especially promotion) and between salaries and career structures have also been examined in a few NARS.

Most NARS are understandably sensitive to publicly disseminating any data and analysis relating to compensation issues. Despite this, ISNAR's reports have made recommendations for changes in grades and career structures. In a number of countries, these recommendations have sought to improve the compensation and incentive packages offered to researchers and technical support staff.

ISNAR's advisory work in human resource information systems has mostly been in Asia -- in Bangladesh, Indonesia, Sri Lanka, and Thailand. In these and a few other countries, ISNAR has been asked to help determine the minimum data

Table 2

## HRM Areas Reviewed by ISNAR: By Country [1]

| COUNTRY | Manpower Planning | Training | Compensation | Appraisal | Information Systems |
|---|---|---|---|---|---|
| Argentina | x | xx | xx | xx | x |
| Bangladesh | xx | x | | | xx |
| Burkina Faso | x | x | | | |
| Cameroon | xx | xx | xx | xx | x |
| Colombia | x | x | xx | xx | x |
| Costa Rica | x | x | x | | |
| Dominican Republic | xx | xx | x | | |
| Ecuador | | | | | |
| Ethiopia | xx | xx | | | |
| Fiji | | x | x | | |
| Gambia | | x | x | | |
| Guyana | x | | | | |
| Indonesia | x | | x | | xx |
| Ivory Coast | x | x | x | | |
| Jordan | | x | | | |
| Kenya | xx | xx | xx | | |
| Madagascar | x | x | x | | |
| Malawi | x | x | | | |
| Morocco | x | x | | | |
| Niger | x | x | | | |
| Nigeria | x | x | x | | |
| Pakistan | x | x | | | |
| Papua New Guinea | x | x | | | |
| Peru | | x | x | | |
| Rwanda | x | x | x | | |
| Senegal | x | x | x | x | |
| Somalia | | x | x | x | |
| Sri Lanka | xx | xx | xx | | xx |
| Sudan | | x | | | |
| Syria | x | xx | | | x |
| Thailand | xx | | xx | | xx |
| Tunisia | x | x | x | | |
| Uganda | x | | | | |
| Uruguay | x | | xx | x | |
| Western Samoa | x | | | | |
| Zaire | x | | x | x | |
| Zimbabwe | xx | xx | xx | | x |

[1] Preliminary analysis

Legend: xx Specialist review of HRM area by ISNAR staff or consultants.
x Part of general review of NARS by ISNAR.

needed for key personnel decisions, and to help devise a computerized system for continually updating and effectively utilizing such a data base.

In addition, over the past year, ISNAR staff and consultants have designed a standard information system and software package for HRM in agricultural research institutions. The information system approach suggested by ISNAR has been found to be viable, inexpensive, and implementable -- provided the government "starts small and simple."[3] (However, as should be expected, the task of designing a new system and making it work in a typical government organization is hard and time-consuming -- and there are no shortcuts.)

ISNAR's experience in performance appraisal and improvement is rather limited. Most reviews have briefly touched upon these aspects, but except in a few cases, a detailed examination has not been undertaken. To bridge this experience gap, research on performance appraisal has recently been initiated (a literature review has been completed), and questionnaire data on performance improvement issues have been collected from a few NARS (and are being analyzed).

A few case studies on HRM topics have also been written, notably, planning (Kenya), recruitment (Thailand), conditions of service (Nigeria), information systems, performance appraisal, and research-extension conflict management (Indonesia). In addition, selected organizational behavior topics (such as leadership, delegation, communication, motivation, etc.) have been included in a number of management training workshops. (In-house discussion of further work to be done in these areas is continuing.)

Supplementing the (primarily) advisory activities tabulated in table 2 (and annex 2), ISNAR has also provided training in human resource management, focusing mainly on performance improvement (or organizational behavior) aspects. A large number of management training workshops have been conducted, using both ISNAR staff, consultants, and local resource persons (and materials). In recent years, besides the national-level workshops in a number of countries, regional workshops have been held in the South Pacific (1987), Latin America (1987), and Southern Africa (1988).

Within each of the major HRM areas, the depth and scope of ISNAR's work has varied considerably from country to country. For example, in some reviews the study of manpower issues has encompassed not only planning but also recruitment and development, and compensation issues have covered conditions of service as well as career structures and promotion policies. The review of training requirements has generally focused on aggregate numbers of postgraduates needed in different technical disciplines over a 5- to 10-year period -- but it has occasionally included a detailed assessment of management training needs and the design and conduct of in-service management training workshops.

The sophistication of analysis undertaken and the comprehensiveness of reports submitted have naturally depended on the specific terms of reference of the ISNAR review teams, their composition, the time allotted to HRM issues, and the information made available by NARS counterparts. The nature of recommendations made and follow-up action by NARS leaders and ISNAR has also varied from country to country. Although no systematic study of these aspects has yet been undertaken, an overview is given in annex 2 by region and country. As can be seen, the list is long, varied, and quite impressive.

Table 3 provides an overview of ISNAR's HRM activities to date, by program area (advisory, research, and training) and HRM area, for the period 1981-88. It is clear that the intensity of ISNAR's work -- in terms of depth and scope of coverage -- varies enormously for different cells in the matrix. ISNAR's experience in HRM is strongest in manpower planning and training, followed by compensation and information systems. Lessons from this experience are reviewed below, by major HRM area.

## 3. LESSONS FROM EXPERIENCE

### 3.1 Planning

ISNAR has recently documented fresh evidence that the number of researchers in developing countries has more than doubled in the past 20 years, well ahead of the growth in recurrent expenditures for agricultural research during the same period.[4] In many countries the need for additional scientists remains substantial, but the potential supply from academic institutions is variable in quality (and sometimes in quantity as well). Furthermore, the money for researchers and their operational requirements often remains quite inadequate.

Hence, the matching of supply and demand will remain a problem in the foreseeable future. To overcome this difficulty, a serious effort in priority setting will be required for properly channelling available manpower. In addition, planning and training will have to be closely integrated with program management, so that manpower projections and training goals remain realistic and feasible.

In the future, it will be essential that the NARS first undertake strategic planning and then set priorities, formulate programs, and estimate manpower requirements. It will be necessary to fully involve researchers at each stage. Since this might require a substantial change in current practice in most NARS, a general planning issue is: how to move from "what is" to what "should be."

In other words, although the principles are known, and some useful planning tools and guidelines are available, we need to develop (and use) simple but sensible methods of demand estimation under conditions of financial and technical uncertainty and unpredictability.

As a first step, the development of international "norms" -- as for numbers of researchers per one million population in agriculture, agricultural research expenditures as a proportion of agricultural GDP, ratio of PhDs to total researchers, and ratio of researchers to technicians, etc. -- could provide preliminary "benchmark" figures. (This is being attempted by such agencies as the World Bank, FAO, and ISNAR.)

However, detailed demand estimation (by program, discipline, qualification, training, and experience) -- and the establishing of relationships between these estimates and the specific output goals of program plans -- must inevitably remain the responsibility of experienced researchers and managers. The main requirement therefore is to devise guidelines for credible estimation of manpower needs without imposing inflexible norms or mathematical formulae on research scientists.

Table 3

## ISNAR's Activities in Human Resource Management, 1981-88

| | Manpower Planning | Training | Compensation | Appraisal | Performance Improvement | Information Systems |
|---|---|---|---|---|---|---|
| Advisory Service | | | | | | |
| • General Reviews | xx | xx | x | x | | x |
| • Specialized Reviews | xxx | xxx | x | | | xx |
| • System Design/ Implementation | x | xx | | | | xx |
| Research | | | | x | x | xx |
| Training | | | | | xx | |

Legend
xxx : High intensity *
xx : Moderate intensity
x : Low intensity
: Little activity

* Note : This index is a composite indicator of depth and scope of coverage. The table is based on the author's subjective assessment of ISNAR's HRM work to date.

Furthermore, to the extent adequate techniques are as yet -- or are even unlikely to be -- developed, appropriate organizational mechanisms will be needed for disaggregating strategic and master plans into program activities, jobs, and scientist-years, and for further estimating the disciplinary inputs needed for delivering the specified quantity and quality of outputs.

The simultaneously top-down and bottom-up planning process required for this would be difficult to institutionalize in any traditional government system -- and a NARS is no exception. However, such a process might be a precondition for reconciling the available money and manpower with the scientists' "minimum needs" for effective research.

Viewed in this fashion, the main pending issue can be stated in organizational terms: i.e., how to introduce collaborative, "bottom-up" planning without unduly diluting the legitimate hierarchical and budgetary authority of top managers. Here again, an international organization such as ISNAR can assist NARS managers in finding their own solutions.

In more specific terms, the methodological approaches used by ISNAR (annex 1) for making manpower estimates and plans are fairly straightforward, as are the major considerations that must be kept in mind. Some of these considerations are outlined in another ISNAR working paper.[5] The main difficulty lies in applying general tools and considerations to particular situations and in making the necessary subjective assessments of financial feasibility and administrative practicality.

To facilitate the work of senior NARS managers responsible for manpower planning, more specific lessons of ISNAR's experience are noted below.

- First and foremost, organizational and program-related matters need to be resolved before any serious manpower demand projections are made. If this is not done, the manpower projections can easily become outdated.

- Second, even when the proper sequence of program strategy, master-planning, and (re)organization has been followed, detailed program planning is necessary before credible demand estimates of specializations, experience, and training requirements can be obtained.

- Third is the need for hard numbers and a sound information base for determining present manpower inventories, past trends, and future possibilities. Planning undertaken by ISNAR illustrates the benefits of a thorough assessment of demand and supply. Because the usefulness of results depends on the accuracy and credibility of the data used, "informed guesses" need to be supplemented by rigorous analysis of numbers.

- Fourth, the basis of this analysis is crucial. Analysis of historical trends and past experience is a good starting point for planning, but since future circumstances -- especially availability of funds -- can deviate substantially from past trends, realism is needed in estimating future constraints of manpower, money, and facilities. "Constrained" demand-and-supply analysis is therefore essential, and requires that the scientists' wish lists of research requirements be tempered with senior managers' judgments of political and administrative feasibility. This golden mean could perhaps be termed "cautiously optimistic" planning.

- Fifth, planning for manpower should also include categories often left out -- mainly technicians, technical staff, and administrative support staff. These nonscientist categories are essential for effective research and are not always available when needed. The inclusion of technical staff in several ISNAR reports draws attention to an often neglected area.

- And sixth, it is obvious that responsibility for sound manpower planning -- that includes all relevant agencies and personnel categories and that connects manpower issues with strategic, program, and organizational considerations -- can not be left solely to an isolated manpower and training office at ministry headquarters. Unless the planning task is taken seriously by the researchers themselves and by their line managers -- both in terms of providing the needed inputs and in interpreting and revising the tentative results of analysis -- the exercise can become quite meaningless.

Other lessons can also be stated. These relate primarily to the scope, processes, and methodology of planning.

- The scope of manpower planning has to be broad enough to cover the major sources of supply (local universities, regional and international labor markets, etc.) as well as the potential competitors for the available manpower (parastatals, private agro-industry, nonresearch employment, etc.). In other words, the matching of demand and supply presupposes a good fix on both sides of the equation. At the same time, the scope of planning should be narrow enough to be manageable within the resource and skill constraints of NARS managers. Assistance from specialists in ministries of planning or from technical assistance agencies can, at times, be a good investment.

- While undertaking this detailed organizational and program planning, unanticipated shortfalls (or less likely, surpluses) of skills and training can become apparent, requiring revisions in previously determined master plans and organizational structures. The process of planning must thus be iterative and continuous, so that the plans remain realistic and realizable.

- The benefits and necessity of this iterative approach are obvious to anyone who has attempted systematic strategic and master planning, even as a training exercise. The need for commitment and participation of high-level NARS leaders is therefore imperative. The benefits (though not the necessity) of involvement of knowledgeable outsiders can also be considerable, if properly managed by the nationals.

- Even when suitable participatory processes for planning are used, the long-term manpower implications of strategic shifts in program and organization can seldom be accurately estimated in advance of events. The need for combining experienced judgment with quantitative estimation of requirements is obvious.

- And finally, each NARS must be treated as a unique case. For detailed manpower analysis, the larger and more complex NARS (say, with more than 100 scientists and a diversity of research institutes and programs)

require relatively more complicated tools than the smaller, less diversified NARS. However, despite this difference, the basic principles of sound manpower planning apply equally in all cases.

### 3.2 Training

Many NARS have undertaken, with ISNAR and other donors' assistance, systematic upgrading of the educational qualifications and technical skills of their newly recruited young scientists. A variety of training strategies and approaches have been used, combining apprenticeship, university, on-the-job, and in-service training, and using a mix of twinning, contractual, and technical assistance arrangements.

Because long-term training is expensive, government budgetary resources for training have often been supplemented by financial support from other sources. Over the years, many researchers have invested their time and effort in improving their qualifications and competence, expecting that this would increase their research productivity and improve their career prospects. System-level managers have also shown keen interest in training.

In terms of pay-offs, ISNAR's experience in a number of countries has shown that long-term training plans have generally been ambitious but reasonable, and have yielded the desired benefits. As a result, training has become a well-established -- possibly even a favored -- function within many developing-country NARS.

Thus, in a number of these NARS, a great deal has already been accomplished in training, or is well on its way to being achieved. Most interested parties believe that the substantial investment in training has largely been worthwhile.

Yet, recent ISNAR experience indicates a few concerns:

- University-based training has to be made more relevant and cost-effective. In most agricultural universities in developing countries, such constraints as heavy teaching loads, poor research facilities, lack of incentives for research, and perennial budgetary shortfalls have to be tackled urgently.

- For this, bilateral and multilateral donor assistance as well as collaborative and cooperative programs with foreign universities are useful. In addition, the involvement and commitment of senior policymakers in the concerned national ministries and institutions are needed. Unless these are forthcoming, the efforts of external agencies cannot lead to tangible results.

- With regard to in-service training in NARS, the main general concern stems from the need to focus more clearly on the relevance and quality of training -- rather than on the numbers trained and courses held. The general principles of good training are well known. What is now needed is to conduct a thorough review of existing efforts in the NARS so that suitable improvements can be made.

(In addition, ISNAR could ensure closer integration of its advisory and training activities in various regions and countries. Greater emphasis is already being given to materials development for training in agricultural research management. Both of these steps will help improve the impact of training provided by ISNAR.)

Other more specific issues can also be discerned in relation to training undertaken in NARS:

- First, managers are becoming justifiably concerned about the relevance, quality, responsiveness to local needs, and cost-effectiveness of training undertaken by their national systems.

- Second, now that the numbers of people trained and training programs conducted seem largely satisfactory, questions of evaluation and impact of the training received are relevant and timely.

- Third, the appropriate balance between training in purely technical subjects and in management topics, and between training for improving individual capacities and for building system capabilities is yet to be established.

- Fourth, notwithstanding the highly encouraging response by NARS managers to management training workshops, there is concern that training of individuals (in such areas as strategic planning, priority setting, program formulation, organizational options, monitoring and evaluation, and human resource management) might not readily lead to system-level improvements -- unless organizational and management procedures and practices are simultaneously reformed.

- Fifth, a related but broader concern is that the training received -- both technical and managerial -- might not be properly utilized because of system-level deficiencies in finances, facilities, and planning. As a result, even good training might yield meager tangible benefits.

- Sixth, the efficiency of training administration, and the selection, placement, reentry, and follow-up of trainees is another problem area. In most NARS, long-term university training is less susceptible to ad-hocism (perhaps due to the involvement of large sums of money and foreign institutions) than short-term in-service training -- which often suffers from a lack of integration of disparate efforts.

- And seventh, the design of training programs, the content and contextual relevance of training materials used, the match between training pedagogy and audience, and the effectiveness of training delivery are other important concerns. While improvements have undoubtedly been made in these areas in recent years, much more needs to be done.

Many of the above concerns/issues in training stem from an appreciation of the requirements and preconditions of effective in-service training. A few of these are noted below, based on ISNAR's experience. The purpose is to draw attention to some key features of effective training and to provide guidelines for the future.

- First, training must get visible and substantial support from senior management. The trainees have to be motivated to improve their performance and must be rewarded for such improvements.

- Second, as the needs of the organization become more specialized, the training needs of different categories of employees have to be identified more systematically and with greater precision. Training must also be more selective: key personnel groups have to be trained in key areas of their work.

- Third, training content must be tailored to audience needs. Skill- and knowledge-oriented courses are appropriate for junior staff, while the senior managers require a broader appreciation of concepts and techniques.

- Fourth, responsibility for training must be shared between line managers and the training department. While the latter has to be responsible for designing and delivering effective training programs, the former must be held responsible for ensuring that this training is put to good use.

- And fifth, it has to be accepted that training is not a cure-all. Top management must acknowledge that nontraining interventions (such as administrative changes, work redesign, salary improvements, and appraisal mechanisms and feedback) can sometimes improve employee productivity more easily, quickly, and inexpensively.

Other general lessons of experience are also relevant: effective in-service training -- in the NARS, as elsewhere -- is need-based, relevant, specific, and goal-oriented. Priorities are determined in advance, and vigorous follow-up action is taken. A strategic plan and time-bound action program are prepared. Because the training effort has a clear direction and focus, training administration does not take precedence over training content, and course design is based on a detailed needs assessment.

More specifically, in relation to training design and evaluation:

- The training objectives, content, and pedagogy have to be well matched. Distinction must be made between changes sought in awareness, understanding, and skills. Except in initial introductory courses, breadth of coverage must be sacrificed for depth of understanding.

- The cost of training has to be judged both in relation to the total investment in human resources and to the opportunity cost of not training. Although a strict cost-benefit approach cannot be followed, investment in training must be expected to yield sufficient payoffs in the long run.

- Periodic evaluation of training has to be conducted so that timely corrective action can be taken. In evaluating training, a distinction must be made between evaluating the trainees after training, evaluating the training courses themselves, and evaluating the impact of training on the entire organization, both in the short and long run.

Many of these are simple lessons. Training specialists can undoubtedly expand the list further and should be encouraged to do so. The result would be a

much-needed assessment of present practice and a delineation of guidelines for further improving the existing state of affairs.

3.3 General

In terms of the broader HRM areas, problems of efficiently managing growth -- of manpower, research programs, and training institutions -- are likely to remain high on the agenda of most NARS.

Under conditions of scarce financial resources -- coupled with the pressing need for producing and delivering useful research -- some hard choices involving shifts in strategy, reduction of marginal programs, redeployment of personnel, restructuring of organizations, and rationalization of research station networks will be inevitable.

Each of these has direct implications for managing human resources. A greater appreciation of these linkages at early stages of system-building would help.

In addition, lessons of experience from the established NARS could prove instructive for countries hoping to expand (and eventually stabilize) their systems. Donors and international organizations in the business of facilitating institutional strengthening in agricultural research (e.g., ISNAR, World Bank, USAID, the SPAAR group) could catalyze this learning process by documenting and sharing their cross-national experience.

Within each NARS, a useful starting point would be to take stock of the available personnel (using an improved HRM information system), assess the institution's educating and training staff, and review the organizational mechanisms used for planning and utilizing manpower. For each of these areas, detailed questions can be formulated, based on the principles of effective human resource management. Upon completion of these reviews, further steps could be taken to build on present strengths in policy, organization, and management.

Because human resource management encompasses many aspects -- of supply, demand, acquisition, retention, and utilization of manpower -- it is unavoidable that the HRM reviews conducted by the NARS (and others) should also selectively examine aspects of strategic and operational planning and management.

The necessarily broad scope of these reviews could, however, be both an opportunity and a challenge. The opportunity is to set things right in a systematic fashion, but this requires a serious commitment in the NARS to face up to the key issues and to engage in a long-term, management-intensive process of diagnosis and reform. Once this top management support has been obtained, however, the sustainability of the effort could be improved.

More specific management issues also need to be addressed, perhaps jointly by ISNAR and the NARS. These include, among other things, determination of minimum "critical mass" of scientists for certain kinds of research; determination of the minimum (required) operating expenditure per researcher; determination of policies and practices for attracting, retaining and motivating sufficient numbers of qualified scientists; determination of measures suitable for improving the numbers, technical competence, and professionalism of fresh graduates; determination of strategies and measures

for strengthening educational and in-service training institutions; determination of measures for improving the quality and relevance of training programs; and determination of policies and administrative measures for improved HRM, in general.

The list can be extended fairly easily. Most of these issues are not easy to deal with -- nor can completely novel solutions be found through the kind of quick analysis usually undertaken in some NARS. Progress on these issues requires a well-planned and prioritized program of field research, involving in-depth sharing of views and experiences by NARS managers (and ISNAR staff) in a collaborative, problem-solving mode.

At a more detailed level of analysis of HRM issues, it is clear from ISNAR's experience in NARS that planning and training are necessary -- but not sufficient -- for effective management of human resources. Also needed are well-designed and properly administered systems for recruitment, deployment, and utilization of staff. These require appropriate policies, regulations, and procedures for hiring, compensating, appraising, counselling, promoting, rotating, and firing people. A further requirement is good organization, leadership, direction, incentives, communication, conflict management, and control.

Some of the prerequisites of effective HRM, and the connections among the HRM "subsystems", are noted in figure 1. Because of subsystem interactions, weaknesses or changes in any particular (specialized) area can have a ripple effect throughout the HRM system.

For example, an insufficient or inadequate manpower pool can:

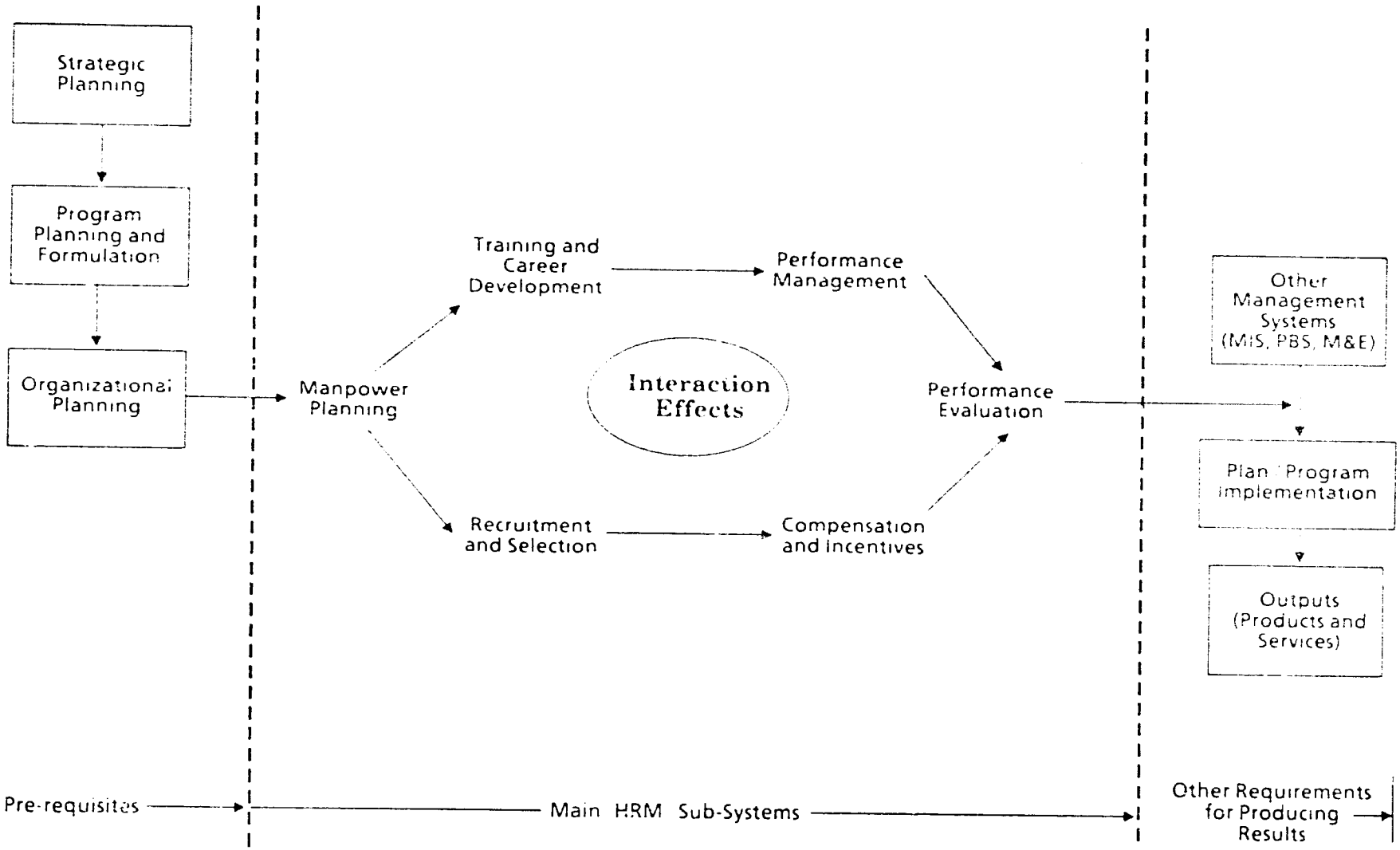
- lead to unfilled vacancies;
- increase salary demands by those hired;
- lead to hiring of under trained staff;
- reduce actual performance;
- facilitate condoning of poor performance;
- increase the need for training;
- lead to unduly quick promotions.

Similarly, improvements in conditions of service (salaries, incentives, rewards, promotion policies) can help increase research productivity by:

- attracting better qualified and more experienced staff;
- improving staff motivation and morale;
- reducing training needs (and costs);
- reducing turnover of competent staff;
- facilitating long-term career and succession planning;
- rewarding merit rather than seniority;
- linking performance (outputs) and rewards;
- providing opportunities for individual growth and development.

Because ISNAR's reviews of NARS typically start with broad questions of program strategy, policy, organization, and management, the logical sequence between these topics (figure 1) has generally been maintained in ISNAR's HRM work. Even when specialized reviews of a part of the HRM system have been

Figure 1. The Human Resource Management System: Interactions



undertaken, the close connection between human resource and program issues has been kept in mind to ensure the relevance and feasibility of recommendations made.

However, a strict order of priority or sequence is not necessary among the specialized HRM areas. Although long-term planning for manpower and training are usually the first steps in an ISNAR systems review, detailed assessments of particular HRM areas can be conducted in any order -- provided the interaction effects on the remaining HRM subsystems are not overlooked.

In general, however, the complexity of the interactions among HRM areas, and the need for dovetailing HRM activities into other areas of management -- for example, program planning, MIS, monitoring and evaluation, etc. -- make the management task rather daunting for some managers.

In a typical NARS, the difficulties in HRM are compounded by the characteristics of the internal and surrounding administrative environment. A NARS is a small part of a much larger government system and usually has limited discretion in devising its own HRM system (even in a semiautonomous parastatal). The general strengths and weaknesses of civil service rules and regulations prevail, with minor concessions made to the special requirements of managing highly qualified scientists and to creating a work environment conducive to high levels of creativity and productivity.

In addition, individual and organizational performance are adversely affected by such factors as weaknesses in (national and institutional level) governance, policy formulation, and planning; funding uncertainties and shortfalls; outdated and bureaucratic civil service procedures for recruitment, appraisal, and salary administration; low salaries and insufficient incentives; weak linkages between performance and rewards; and generally inadequate management.

An in-depth discussion is not appropriate here. Even though the problems are many, a few general guidelines are available and some action possibilities exist. Equally important, no universal solutions are possible in HRM, and each NARS must devise its own response to its unique set of constraints and opportunities. ISNAR's review reports -- and lessons derived from them -- can only help sharpen the issues so that suitable action can follow.

## 4. CONCLUSION

This paper is intended for the generalist agricultural research manager and discusses some key concerns and lessons. The underlying premise is that all managers and supervisors need to become adept in effectively and efficiently managing their human resources.

This management task involves two types of interactions: (i) direct, through face-to-face contact with individuals and their work groups, and (ii) indirect, through managerial systems established by the HRM specialists for the organization or civil service as a whole. Most of ISNAR's advisory work in HRM has focused on the latter, i.e., on the NARS or organization-level activities.

Based on a broad diagnostic review of the NARS, the strengths and weaknesses of the existing HRM system (or sometimes specialized area -- planning, training, etc.) have been analyzed by ISNAR, and recommendations for improvement have been made. In a number of countries, the next phase in ISNAR's diagnosis-planning-implementation (DPI) sequence has involved detailed design of the proposed system. The changes suggested have then been implemented by the NARS leaders, sometimes with assistance from ISNAR.

The lessons of "ISNAR's experience" presented in this paper are thus -- indirectly -- based on the experience of the NARS themselves. However, much of the NARS' direct experience of HRM remains undocumented and unanalyzed. This experience is very relevant for developing practical guidelines for NARS managers, and could provide the basis for field research by the NARS and ISNAR.

Hence, the need and potential for continued collaboration between ISNAR and the NARS on HRM issues remain considerable. This collaboration can lead to further development of ISNAR's and NARS' experience in HRM. The extraction of additional lessons from this experience could lead to a more complete understanding of human resource management in NARS.

Notes:

1. The usual ISNAR review sequence is diagnosis-planning-implementation (D-P-I).

2. ISNAR Data Base (1988) preliminary averages for 1980-85. The number of researchers is measured in full-time equivalent units. The data base covers 129 developing countries, excluding China, Cuba, and Eastern Europe. It includes expatriates (who, according to 1986 World Bank figures for Eastern and Southern Africa, constituted 17% of the scientists in that region).

3. Byron Mook. "Management Issues in the Collection and Use of Information on Research Personnel." ISNAR Working Paper No.16, 1988.

4. Howard Elliott and Johannes Roseboom. "Recent Evidence on Resource Commitments to Agricultural Research." ISNAR, 1988 (mimeo).

5. Paul Bennell and Larry Zuidema. "Human Resource Management for Agricultural Research: Overview and Issues." ISNAR Working Paper No.15, 1988.

Annex 1

# Examples of Manpower Planning Approaches used by ISNAR

In Cameroon (1987), realizing that 75% of the recurrent funds for research went toward personnel costs, the review mission's primary concern was to determine the maximum sustainable size of the NARS. The research system's expansion plans and its current pattern of manpower utilization were reviewed so as to improve the match between future program requirements and the staff likely to be available. Redundancies were identified in some job categories, and recommendations were made to improve recruitment procedures and to upgrade staff quality through better training and career planning.

In Kenya (1982, 1984), on the other hand, an anticipated shortage in the quantity and quality of manpower was the main impetus for formulating a long-term manpower (and training) plan, and this involved a detailed assessment of future manpower needs. The planning exercises took account of a variety of considerations in estimating demand, including (i) comparison with international "norms" (for expenditure, PhD-to-MSc ratio, and researcher-to-technician ratio), (ii) the scientists' "requirements" unconstrained by financial limitations, (iii) past and projected trends in recruitment and attrition, (iv) "constrained" demand (i.e., affordable numbers considering the likely constraints of finance and facilities), and (v) the need for maintaining critical masses of scientists for various programs and disciplines.

In Zimbabwe (1984), manpower planning started with an aggregate (macro-level) assessment. The planners first estimated the number of researchers that could be supported by an (assumed) increase in financial support of 5% (in real terms) over the 5-year plan period, and then determined how the total projected manpower strength of PhDs and MScs could best be utilized for various commodity and disciplinary research programs.

In Tunisia (1984), planning started with an estimation of manpower requirements (in full-time equivalent units) for the projected 10-year research program for each commodity and discipline, assuming stable funding and an appropriate organizational structure. In Ethiopia (1987), in contrast, the manpower assessment was primarily concerned with ensuring that the recently reorganized structure had at least the minimum critical mass of qualified scientists and technicians at each agroecological and commodity research center.

Despite this diversity of approaches, however, the central aim of ISNAR's manpower planning activities in the various NARS has been the same: to provide accurate and realistic estimates of future manpower needs and to devise feasible plans for meeting these needs.

Annex 2

## Human Resource Management: ISNAR Reviews and Follow-up Action [1]

| REGION | MAJOR RECOMMENDATIONS AND ACTION TAKEN |
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| AFRICA | |
| Burkina Faso | 1982 . Recommended increased role of research in institutions not currently involved; studied manpower needs, training needs and the possibility of establishing new research and training centre.<br>1987 . Management training seminar held. |
| Cameroon | 1983 . Recommended improved management of research system; improved management decisions at ministerial and institute levels; training in strategic planning, programming, evaluation, information management, personnel management, management of physical resources, financial management, and budgeting.<br>1984 . Seminar on agric. research management held, based on findings of review.<br>1986 . Three workshops on communication and team building held.<br>1987 . Comprehensive review of major human resource management functions; with recommendations for each. |
| Ethiopia | 1986 . Review of the Institute of Agricultural Research (IAR) and of research program management and manpower planning.<br>. A quantitative, illustrative exercise sets out staff needs up to 1994, but IAR approval needed for a definitive plan to be prepared.<br>. Recommend that programs/stations should be expanded when additional manpower is available. |
| Gambia | 1985 . Recommended improved development and management of human resources.<br>1986 . ISNAR helps national task force prepare proposal for a scheme of service for scientific staff. |
| Ivory Coast | 1982 . Recommended formulation of a master plan for INIRA, with priority on manpower planning for national scientists and creation of a research-training centre.<br>1984 . Training of scientific and technical personnel undertaken. |
| Kenya | 1981 . Recommended study of manpower development and training needs, and strengthening of appropriate national educational institutions; review schemes of service for research staff.<br>1982 . Formulated a comprehensive manpower recruitment and training plan for 1983-87.<br>1983 . Prepared manpower development and training plan, including fellowship and training and development of postgraduate training at Univ. of Nairobi.<br>. Prepared specific plan for postgraduate training in agriculture and veterinary medicine.<br>1984 . Prepared manpower and training plans up to 1994, as part of system review.<br>1986 . Training workshops held. |
| Madagascar | 1983 . Recommended preparation of manpower development plan, including training program, and development of management tools and techniques.<br>1986 . Developed training program.<br>1987 . Programs developed for overseas and national training (for action in 1988). |

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| Malawi | 1982 . Recommended a crash program for training extra staff; developed longer term manpower plan; and reviewed the terms of service of research scientists.<br>1985 . Government implements changes recommended and establishes an agricultural research council.<br>1986 . ISNAR invited to arrange series of research management workshops.<br>1988 . SACCAR/ISNAR management training workshops held. |
| Niger | 1986 . Recommended that the fast-growing national institution should pay increased attention to staff selection and training. |
| Nigeria | 1984 . Research on conditions of service; case study prepared. |
| Rwanda | 1982 . Recommended recruitment and training plan with a 10-year time frame.<br>1985 . Two seminars held for identification of management training needs at different levels. |
| Senegal | 1987 . Prepared a manpower development plan; system review continuing.<br>1988 . Review of selected aspects of HRM. |
| Somalia | 1983 . Recommended manpower development; study of terms of service for researchers; securing of adequate and reliable funding. |
| Uganda | 1986 . Identification of critical mass of scientists needed at major research stations and of future manpower requirements. |
| Zaire | 1985 . A national task force assisted by ISNAR examined statutes of agricultural research personnel, and recommended implementation with amendments. |
| Zimbabwe | 1984 . Prepared manpower training and development plan (1984-88) for Dept. of Research and Specialist Services (DR&SS).<br>1986 . Comprehensive review of HRM, as part of general diagnostic mission.<br>1987 . Implementation planning and follow-up continuing in 1988-89. |
| ASIA | |
| Bangladesh | 1984 . Agreement to work with ISNAR on program to improve the management of human resources.<br>1985 . Collection and organization of data in BARC, using microcomputers and methodology based on ISNAR's work in Thailand; training of local staff.<br>1986 . Workshop held, using information base developed with BARC. Senior officials introduced to micros. Two main results: an awareness of BARC's initiatives in the management of human resources; and ISNAR's commitment to work with BARC on this task. IBRD placed full-time person in BARC to continue this work in the BARC Training Division. |
| Fiji | 1982 . Recommended that after a research plan is approved, the manpower requirements (i.e., numbers and training) for implementation be assessed. More staff may be needed.<br>1985 . To implement the 9th Development Plan 1986-1990 and its research strategy, human resource components require donor support. |
| Indonesia | 1981 . Recommended that AARD prepare a detailed master plan for manpower.<br>1985 . Management information system developed, including human resource components as part of on-going work with AARD. |

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| Pakistan | 1982 | Recommended new career structure for professionals and study of other HRM aspects, especially training requirements. |
| | 1984 | ISNAR provided staff inputs to IBRD funded agricultural research project. Special emphasis on staff development and training administration. |
| | 1987 | Recommended that human resource planning follow program planning and be focused on improving efficiency of existing research staff. A well-developed computerized information system is needed for this. |
| Papua New Guinea | 1982 | Manpower development program proposed, based on the recommended reorganization. |
| S. Pacific Is. | 1981 | Recommended regional and international training of nationals. |
| | 1987 | Management training workshop held. |
| Sri Lanka | 1983 | Recommended general review of personnel policies, especially postgraduate training of agricultural research officers and conditions of service. |
| | 1984 | Review of manpower and training requirements for scientists, as part of 3-country case study. |
| | 1985 | Preparation of training component of IBRD funded project. |
| Thailand | 1983 | ISNAR provided staff inputs to a national commission whose mandate covers manpower planning in the Department of Agriculture (DOA). Collection of data on graduate employees of the DOA begun. |
| | 1984 | Collection of data and verification completed, with substantial assistance from staff of DOA. Three working papers prepared. |
| | 1985 | Four additional working papers prepared and presented. Plans for information system for HRM drawn up. |
| | 1986 | Preparation of draft project proposal for the Civil Service Commission and the DOA to strengthen the DOA's personnel management capacity and introduce the use of microcomputers in managing personnel information. Ditto for the civil service as a whole. |
| Western Samoa | 1983 | Recommended systematic needs assessment as part of the planning and programming exercise and formulation of an interim training program. |
| | 1984 | Prepared manpower development and training project. |
| LATIN AMERICA | | |
| Argentina | 1985 | Review of manpower and training requirements, as part of 3-country case study. |
| | | Prepared a comprehensive plan for managing and developing professionals in INTA, including review of conditions of service. Workshop on agricultural research management held. |
| Colombia | 1985 | General review of HRM system, including review of conditions of service. |
| Costa Rica | 1981 | Recommended introduction of in-service training for research and extension staff and improvements in conditions of service for staff. |
| | 1987 | Recommended continuation of efforts to improve manpower utilization. |
| Dominican Rep. | 1983 | Identified as a central limiting factor the inadequate personnel policies of the research department (IDIA) in Ministry of Agriculture. |
| | 1986 | ISNAR paper, giving complete analysis and summary of the redesign of IDIA, presented to IDIA and donor. |
| Ecuador | 1988 | ISNAR reviewed HRM issues, using questionnaire on human resources. |

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| Guyana | 1982 | . Recommended an institute within or closely associated with the University of Guyana, with staffing patterns that maximize use of resources. |
| Peru | 1985<br>1986 | . Recommended sustained support for personnel development in a largely effective system.<br>. A new career structure developed. |
| Uruguay | 1986<br>1987 | . Exploratory review.<br>. Assistance in the design of a human resource development plan. |
| WANA | | |
| Jordan | 1984 | . Review of manpower and training requirements, as part of 3-country case study. |
| Morocco | 1984 | . Recommended preparation of a manpower development and training plan. |
| Sudan | 1983<br>1986<br>1987 | . Development and management of human resources considered essential. Requires a survey of training needs to improve the management of research. Action deferred; for inclusion as a component of proposed IBRD project.<br>. ISNAR requested to assist in the design and implementation of a research management training program for senior research administrators.<br>. Training at ISNAR of a Sudanese officer, to develop training courses in planning and managing agricultural research.<br>. National workshop on planning and agricultural research management held, using a specially designed human resource development questionnaire. |
| Syria | 1985<br>1988 | . Identification of training needs for cotton research program.<br>. Human resource analysis, as part of the review of the Directorate of Agricultural Research. |
| Tunisia | 1984 | . Prepared a five-year manpower training and development plan for the specialized institutos. |

[1] Based, in part, on Fred Haworth's content analysis of ISNAR's mission reports, 1988 (draft, mimeo).