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MANAGEMENT ISSUES IN THE COLLECTION AND USE OF INFORMATION ON RESEARCH PERSONNEL

Byron MOOK

ISNAR

International Service for National Agricultural Research

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November 1988

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ISNAR WORKING PAPERS

The ISNAR working papers series is a flexible instrument for sharing analysis and information about relevant organization and management problems of the agricultural research systems in developing countries.

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2. They are intended to be an effective vehicle for widening the discussion of continuing work, thereby increasing the quality of the final products. Critical comment is welcomed.

3. The series provides an outlet for diffusing materials and information which, because of their limited coverage, do not meet the requirements of "general audience" publication.

The series is intended mainly for diffusion of materials produced by ISNAR staff, but it is also available for the publication of documents produced by other institutions, should they wish to take advantage of the opportunity.

I. THE MOST VALUABLE RESOURCE OF AN AGRICULTURAL RESEARCH ORGANIZATION IS ITS PEOPLE

True. Yet, many research managers pay minimal attention to the management of their human resources. It is actually the exceptional agricultural research organization which does recruitment planning on a regular and continuing basis. Very few such organizations have rolling training plans. Almost none has career plans. The evaluation of personnel is often a formalized, bureaucratic, and not very useful process.

The management challenge is clear... Most national agricultural research systems (NARS) today put at least 60% of the public funds they receive into personnel. Many NARS actually put more; figures of 80%-95% are not uncommon in sub-Saharan Africa. Yet the information on these people available to management is often fragmentary. Who are they? How many of them are there, what are they working on, what are their training needs, and what decisions regarding careers and postings will management likely have to make in the years ahead? Such information is a prerequisite for planning and evaluation.

The discovery of answers to these questions requires a commitment to action from research managers. The planning and management of "human resources" and/or "personnel" should be near the top of their lists of priorities.

Why, therefore, have most research managers tended to pay so little attention to human resources? The answer may be both semantic and organizational. In the minds of many research managers, "human resources management" equals "personnel management"; i.e., a function which is administrative, routine, and often troublesome. Similarly, personnel divisions in most research organizations are concerned with salaries, pensions, and leaves -- not subjects on which a senior manager would like to spend much time. As a result, an important item on the agenda of the progressive research manager is to upgrade the status and importance of the "human resources / personnel management" function.

The following general facts and principles are therefore worth stating at the beginning:

(1) human resources are the biggest asset of any research organization;

(2) senior research managers should therefore give more attention to managing these resources;

(3) conscious attempts should be made to remove bureaucratic stigma attached to the term "personnel management";

(4) senior research managers should try hard to strengthen existing "personnel divisions" and to broaden their mandates.

II. THE IMPORTANCE OF GOOD INFORMATION ON HUMAN RESOURCES

Why is good information on human resources a critical resource in the hands of the research manager? There are three reasons.

(1) Most important, to provide the basis for good recruitment, training, and career planning and for good personnel evaluation. Without information, the performance of these critical management functions is impossible.

(2) To strengthen the case for more resources. Policymakers are more likely to authorize more and better personnel for research when they can base their decisions on well-researched, well-documented, and well-argued cases. "Wish lists" are not likely to be persuasive.

(3) To present the case for reform. Similarly, policymakers are not likely to be impressed with vague calls for organizational change, for improved service conditions for researchers, or for more regular budgeting and financial disbursement procedures. The burden of proof is on research managers to make strong arguments.

III. DEVELOPMENT OF A HUMAN RESOURCES INFORMATION SYSTEM

A Human Resources Information System (HRIS) may or may not be part of a wider Management Information System (MIS). If it is, a full MIS would be likely to have at least four clearly identifiable components. Figure I summarizes these four. The two columns show the *uses* to which good information can be put, while the four rows show the *subjects* an MIS ideally covers.

(1) A CRIS -- Current Research Information System. What projects are actually being carried out? What are their objectives, where are they taking place, when did they begin, when will they end, and what are their expected outputs?

(2) A HRIS -- Human Resources Information System. The subject of this paper.

(3) A FRIS -- Financial Resources Information System. How much are different programs and projects actually costing? One of the major challenges to a research manager is to allocate to specific activities the budget which most NARS spend on personnel.

(4) A PRIS -- Physical Resources Information System. What buildings and equipment are available for the implementation of research?

Figure 1.

MIS

	PLANNING & PROGRAMMING	MONITORING & EVALUATION
PROJECTS	STRATEGY TACTICS	OUTPUT IMPACT
PEOPLE	RECRUITMENT CAREERS TRAINING	PERFORMANCE
MONEY	BUDGETING	ACCOUNTING / AUDITING
THINGS	PROCUREMENT	STOCK CONTROL

What does one of these component information systems, for example, a HRIS actually consist of? What is an "information system"? The best answer is: a "database", which in turn is really nothing more than a fancy word for "file". If a research manager keeps an address book in which names, addresses, and telephone numbers are written, then (s)he is already managing a database. Whenever (s)he wants to find the address or telephone number of someone in the book, (s)he usually looks under the appropriate last name. In computer terms, (s)he is "searching the database by last name".

IV. MANAGEMENT ISSUES IN THE DEVELOPMENT OF A HUMAN RESOURCES INFORMATION SYSTEM -- AN OVERVIEW

A research manager must deal with four main issues in the development of a HRIS. Each is summarized here and then discussed more fully in Sections V-VIII.

(1) Content. Many research managers want to include in a HRIS more data than they can realistically use. Personnel managers, particularly, often want to collect and store data on all subjects now covered in individual personal files. Such an approach means that they may wind up with 75-100 variables on family background, education, career progression, and civil service status. The alternative is to pare such a "wish list" down to 15-25 of the most essential variables.

(2) Data collection and updating. These two issues are clearly interrelated. First, any good HRIS requires valid and reliable benchmark information. But second, whatever information is collected must be updated at appropriate intervals. The following questions will therefore require answers.

(a) Source. Where are most personnel data likely to be found?

(b) Methods. What are the best ways to get at these data?

(c) Personnel. What are the staffing implications of decisions over how HRIS data are to be collected and updated?

(d) Non-Personnel Costs. What inputs other than personnel are needed to make a HRIS operational?

(3) Data management. What happens to information after it has been collected (or updated)? Two issues are likely to be particularly important under this heading.

(a) The organizational home for HRIS activities. What are the relative merits (and demerits) of locating HRIS work in a central personnel division, in a planning division, in a separate MIS unit, and / or in a data processing unit?

(b) Centralization vs. decentralization. Where in the NARS should most data checking and entry occur?

(4) Data use. The end-product of all HRIS work. Who are the main users? What types of reports and data are officials outside the research organization likely to want? How can institutes/stations be encouraged to be both suppliers and users of information?

V. THE CONTENT OF A HRIS

The starting point here must be a commitment to "begin small". Lots of things about research personnel are interesting to know. But the manager has to ask hard questions about his/her ability to collect data, to manage them, and -- most important -- to use them.

Specifically, what human resources management functions must be performed - and what data are needed to perform them? The following list of functions is a basic one:

recruitment planning;
training planning;
career planning;
personal evaluation;
training administration;
salary/benefits administration;
pension/insurance administration;
leave administration.

Each of these functions requires different data. The lists of data which follow are intended to be illustrative and *not* definitive. Each research organization must decide what it wants and needs to know. Information that may be required at the national level may not be required at the institute/station level and vice versa.

Furthermore, as noted above, the research manager responsible for deciding on the content of a developing HRIS should not try to include too much. His/her focus must be on basic or minimum information. There are likely to be enough problems in just getting the database established and running, and new and more detailed information can always be added later. "THINK SMALL".

Basic Information for Recruitment Planning. This part of the HRIS includes information on current research personnel. The research manager needs to analyze who he has before he can make judgments about who he needs. Only seven main variables are likely to be needed.

(1) Names.

(a) Primary Name. In some countries, this name will be the last one. In others, it will be the first name or one in the middle.

(b) Secondary Name(s).

(2) Age. It is usually best to list by birthday. Sorting is likely to be easier if years are listed first. Therefore 18 July 1942 becomes 42.07.18.

(3) Sex.

(4) Highest Degree. The planner is usually more interested in the highest degree than in lower degrees.

(5) Discipline. The subject in which the highest degree was earned.

(6) Commodity or Subject Specialization.

(7) Current Assignment.

(a) Institute/station.
(b) Department/program.

Basic Information for TRAINING PLANNING. This part of the HRIS includes all the above information (seven main variables) plus information on most recent training.

(8) Most Recent Short-term Training.

(a) Subject.
(b) Year.
(c) University/institute.

Basic Information for CAREER PLANNING. This part of the HRIS includes variables nos. 1-7 above plus more detailed information on career and current position.

(9) Date Entered Service. This date may be that of entry to government service, or that of entry to the agricultural research organization.

(10) Past Postings. This information is useful in the assignment of staff to "more favorable" vs. "less favorable" geographic locations. For each past posting:

(a) Location.
(b) Years (e.g., 1979-1983).
(c) Total years at this location (e.g., 4).

(11) Current Posting.

(a) Title.
(b) Grade.
(c) Step-in-grade (e.g., basic salary).

Basic Information for PERSONAL EVALUATION. This part of the HRIS includes variables nos. 1-7 and 11 above plus the following information on activities in the period under review. Many of these last data are fairly subjective.

(12) Service.

(a) Committees.
(b) Other institute/station management tasks.

(13) Leadership.

(a) Projects headed.
(b) Training given.

(14) Output.

(a) Papers written.
(b) Presentations made.

The final four management functions on the original list -- *administration of training, salaries/benefits, pensions/insurance, and leave* -- have data requirements that are specific to each NARS. Standard lists are therefore difficult to draw up. The research manager must decide what he needs to know about each of these subjects, how often he needs to know it, and what the costs are likely to be of trying to enter this information into a HRIS.

In general -- again -- the basic attitude of a manager must be: "THINK SMALL". The above list of 14 variables is not a long one.

VI. DATA COLLECTION AND UPDATING

Source. Where are most data on human resources likely to be found? The most obvious location is personal files. All NARS maintain such files, often with considerable breadth and depth of detail. It is not unusual to find in them data on family members (including parents), school records, military and religious service, and even maps showing where one lives.

Rigorous collection of basic data from files is the first step in the establishment of a new HRIS. Much of the information listed above -- variables nos. 1-14 -- is likely to be there somewhere.

Nevertheless, dependence on personal files presents three problems with which the manager must deal.

(a) Completeness. Some data are always missing from personal files. Data to be used for personal evaluation -- that is, variables nos. 12-14 -- are particularly likely to be insufficient.

(b) Currency. Some information in files is always out of date. Most NARS do not give institutes/stations/scientists incentives to provide data at regular intervals. If rewards like salary increases and promotions do not depend on keeping a personal file current, the chances are very high that updating will not be systematic.

(c) Location. Personal files at national headquarters are always different from those at institutes/stations. In some NARS, information at national headquarters may be of good quality. But in others, institute/station information may be better because most personnel administration is handled there and/or because incentives to provide data to national headquarters are weak.

In addition to personal files, the next most accessible source of data is scientists themselves. They are the most complete sources of information about their own backgrounds and careers though, of course, not necessarily the most reliable or unbiased ones. Collection of data from scientists is discussed immediately below.

Methods. The process of gathering data from personal files can be laborious. In some NARS, such files are well organized in which case the time required to pull out information on all or most of variables nos. 1-14 above may be short. But the usual situation is that personal files are somewhat chaotic. In addition to information that should be included in a HRIS, files may also contain letters, certificates, petitions, requests for leave, etc. In such cases, the amount of time required to locate even basic data may be considerable.

The alternative to dependence on personal files is questionnaires. Two kinds of questionnaire are likely to be important. The first collects baseline (benchmark) data on variables nos. 1-11 particularly. The second is for periodic updates, and for variables nos. 12-14.

Just as with personal files, however, questionnaires present several problems with which the research manager must deal.

(a) Distribution. Who should be responsible for distributing questionnaires and for ensuring returns? One possibility is the national headquarters of the research organization -- although then considerable travel by headquarters staff may be necessary. The other is institutes/stations themselves -- although then considerable time will have to be spent at the beginning in involving institute/station managers in HRIS activities.

(b) Incentives. What incentives can be given to individual scientists to encourage them to fill out questionnaires? Experience suggests that scientists are often very reluctant to participate in what they regard as "useless surveys". The response rate from mailed questionnaires is likely to be low.

Financial incentives are one possible solution but are not likely to be administratively possible. In most civil service environments, money cannot be paid for such a purpose -- unless, for example, the provision of "travel costs" to go somewhere to fill out the questionnaire is feasible. Salary and career disincentives may hold promise -- that is, salaries will not be paid until questionnaires are returned. The problem with this last approach is that civil service rules in most NARS will not allow such "punishments" without a more major cause.

(c) Frequency. How often should questionnaires be sent out? The most common answer is once a year. Only in exceptional circumstances will the research manager need more frequent updates of HRIS information.

Personnel. What are the staffing implications of how HRIS data are to be collected and updated?

The answer to this question depends on answers given to the "source" and "methods" questions immediately above. If primary dependence is to be placed on personal files, the amount of staff time will be heavy at the beginning, when each file must be gone through to extract basic data. After that initial search, however, staff work will be less. Only new data will have to be dealt with. The potential problem, as noted above, is that both the original data in these files and these new data may be incomplete and/or out of date.

Reliance on questionnaires requires more staff work. Not only must personal files be gone through at the beginning to collect basic data, but questionnaires must then be designed and responses monitored. The division of labor between the national headquarters of a NARS and institutes/stations will determine how much staff time needs to be spent.

If interviews with individual scientists have to be carried out, either at the beginning (to collect benchmark data) and/or annually (to collect new data), then staff costs may be considerable.

Non-Personnel Costs. What resource inputs other than personnel are needed to make a HRIS operational?

Once again, answers to this question depend on answers given to the "source" and "methods" questions raised above. Three obvious categories of potential non-personnel expenses are involved in setting up a HRIS.

(a) Travel. If a decision is made to emphasize questionnaires as a means of collecting data, then a significant amount of staff travel is likely to be unavoidable. Questionnaires must be explained and distributed, both functions often best performed in person. Non-respondents must be chased. And if the updating process is to be an annual one, then data collection can become almost a continuous activity.

(b) Training. A related point. If institutes/stations are to take a major role in data collection and use, then officials of those institutes / stations must be involved right from the beginning. They should participate in the design of the HRIS, in the trials of it, and in the ongoing management of it.

(c) Microcomputers. A HRIS in the early stages is likely to be based on both papers-and-pencils and micros. But most NARS will want to think about making the transition to micros as soon as possible. The manager of a HRIS which uses micros will be able to operate much more quickly in searching for data, producing tables and charts, and updating information.

The costs for micros are not large. One high-capacity micro is enough to handle a HRIS for most NARS and the cost will be under $10,000. Smaller micros for use at institutes /stations will cost less than $4000 each.

VII. DATA MANAGEMENT

Two important organizational issues must be resolved under this heading. The first is one of an organizational "home" for HRIS work at national headquarters. Should the focal point for HRIS activities be in the personnel division, in the planning division, in the data processing division, or in a separate MIS unit?

The second is one of centralization vs. decentralization. Should HRIS data be checked and entered (onto either cards or into a microcomputer) at the national level or at the institute/station level?

An Organizational "Home" for the HRIS. This issue is without doubt one of the most important ones facing the research manager responsible for a HRIS. How (s)he deals with it will be an important determinant of the success or failure of *all* HRIS activities.

There are at least four possible locations for HRIS activities.

(a) The personnel division. Probably the best "home" for a HRIS. Most of the data are likely to be in this division as are most of the users and uses.

But there are two disadvantages to locating a HRIS in a personnel division. The first is that coordination with any NARS-wide MIS may be difficult. For example, a NARS-wide MIS will contain information on project content and output which the manager will need for evaluating the activities of his / her personnel. But if the MIS and the HRIS are in different offices, then communication between them will become an additional management problem.

The second disadvantage is an attitudinal one within many personnel divisions. As noted above (Section I), such units are often concerned primarily with salaries, pensions, and leaves -- and not with planning or evaluation. If a personnel division is to be given responsibility for a HRIS, therefore, NARS management will need to make special efforts to move it away from attention to such purely administrative functions.

(b) The planning division. The advantages of locating a HRIS in such a unit are reverses of the disadvantages of having it in a personnel division. The HRIS will be closely integrated into a NARS-wide MIS, and the primary uses of data will be more for planning than for administrative purposes.

On the other hand, most of the uses of a HRIS should be for functions performed mainly in the personnel division. Recruitment, training, careers, and evaluation are all issues which fall within the mandate of such divisions.

Whichever of these first two options the manager chooses -- the personnel division or the planning division -- the important task is to establish good communication procedures between them. Once again, microcomputers provide a practical means of achieving this goal. A HRIS can be headquartered in the personnel division and can provide data on floppy disks to a NARS-wide MIS located in the planning division. The only requirement is that both MIS components use the same hardware and software.

(c) An MIS unit. Almost certainly not the best "home" for a HRIS (or, in fact, for any kind of MIS work). There are likely to be two major problems if such an approach is adopted. First, a separate MIS unit will be cut off from most users of its products -- who are most likely to be in the planning, personnel, and finance divisions. And second, a separate MIS unit will usually lack the organizational authority to work with institutes/stations and with individual scientists to collect good data and to encourage effective use.

(d) The data processing division. Probably the least desirable "home" for a HRIS. The same arguments made immediately above against a separate MIS unit apply here also. The collection and use of information for planning, programming, monitoring, and evaluation are substantive issues and therefore the legitimate responsibilities of officials in planning, personnel, and finance divisions.

A DP division need not become involved in information systems simply because microcomputers are being used. Micros are today becoming simpler and simpler for professionals to use. The research manager should therefore be sure that they are on the desks of his / her planning, personnel, and finance people and not located exclusively in DP divisions. Micros are tools, and information is a means and not an end.

Centralization vs. Decentralization. The performance of three distinct management functions is at issue here.

(a) Checking. Once data have been collected (see Section V above), they must be checked for both completeness and accuracy. Where should this checking function be performed? There are three general possibilities: at the national level (using personal files), at the institute/station level (using a combination of personal files and individual contacts), and/or at the individual level.

A strong case can be made for checking by the individual scientist. As noted above, personal files may be less than complete and up-to-date. If the manager has made a decision to put his HRIS on a microcomputer, however, then the generation of a one-page printout for each scientist in the organization is easy. The manager can send this printout to each scientist for additions, deletions, and/ or corrections.

(b) Entering. Where should the entry of data onto either cards or into a microcomputer occur? The manager must be certain that information is being entered in standard formats which will facilitate later compilation and analysis.

There is almost certainly an issue of timing here. At the beginning, when a HRIS is just being established, entering of data should probably be done at the national level. Staff there can be trained more easily, unexpected problems can be dealt with more readily, and quality control can be assured. But once the system is established, data can be entered at the institute/station level. Information can then be kept close to some of its primary users and only that information which national headquarters requires needs to be sent up.

Once again, a decision to use microcomputers for a HRIS brings specific advantages. Data entered on a micro at the institute / station level can be brought to national headquarters on a single floppy disk for immediate inclusion in a national database. Perhaps even more important, managers and scientists at the institute / station level can use their own data immediately.

(c) Maintaining security. Except for variable no. 11c (Step-in-Grade), there is no other information on the basic list which either scientists or managers are likely to see as confidential. But if the HRIS is later expanded to include other data, privacy and security issues may arise. The HRIS manager will then need to devise procedures which will limit both the number of people who collect and input such information and the number of people with access to it.

The former restriction is actually more difficult to organize than the latter. Once data are in a microcomputer, it is relatively easy -- from a technical point of view -- to close off complete files or parts of files to unauthorized users. The more demanding management challenge lies in controlling access to information in hard copy, at the time at which it is being collected and while it is being entered.

VIII. DATA USE

Users of information from a HRIS fall into two broad categories.

(a) National. Organizations in this category include planning ministries, finance ministries, special commissions, secretariats to cabinets or parliaments, and foreign donors.

NARS managers are continually being asked to provide information to such organizations. The purposes vary: planning, monitoring / evaluation, and project identification / preparation. A complete and functioning HRIS can facilitate the provision of such information, thereby both decreasing the workload of the NARS

and building up its image as a progressive and well-managed operation.

(b) Institute / Station. In large NARS, particularly, a big part of planning, monitoring/evaluation, and project identification / preparation functions must be performed on a decentralized basis. Research institutes/stations therefore need the information and organizational support provided by a national HRIS.

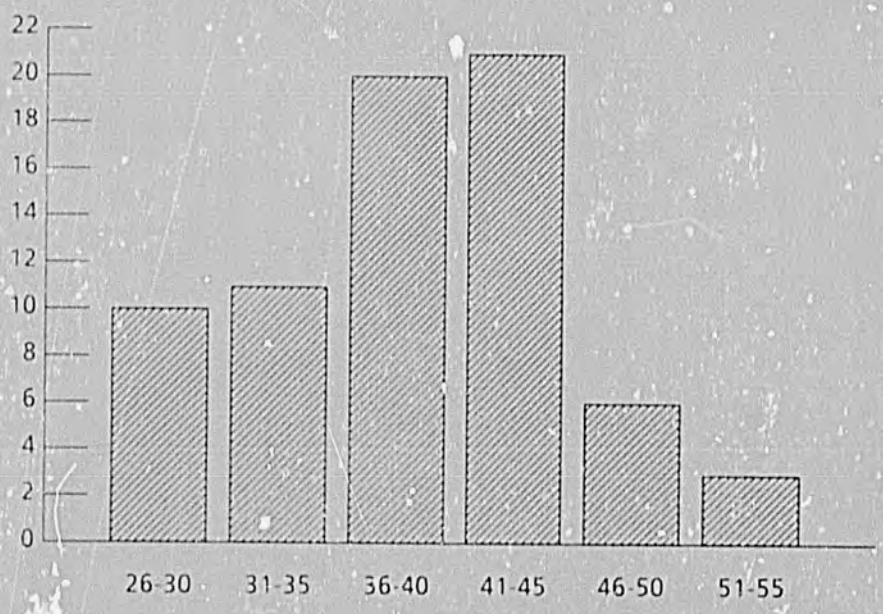
The uses of a HRIS are best discussed through examples. The remainder of this paper therefore provides a sample of HRIS outputs. All data come from NARS in Asia. The purpose of including these samples is to give a flavor of the many and varied uses to which a good HRIS can be put.

Recruitment Planning

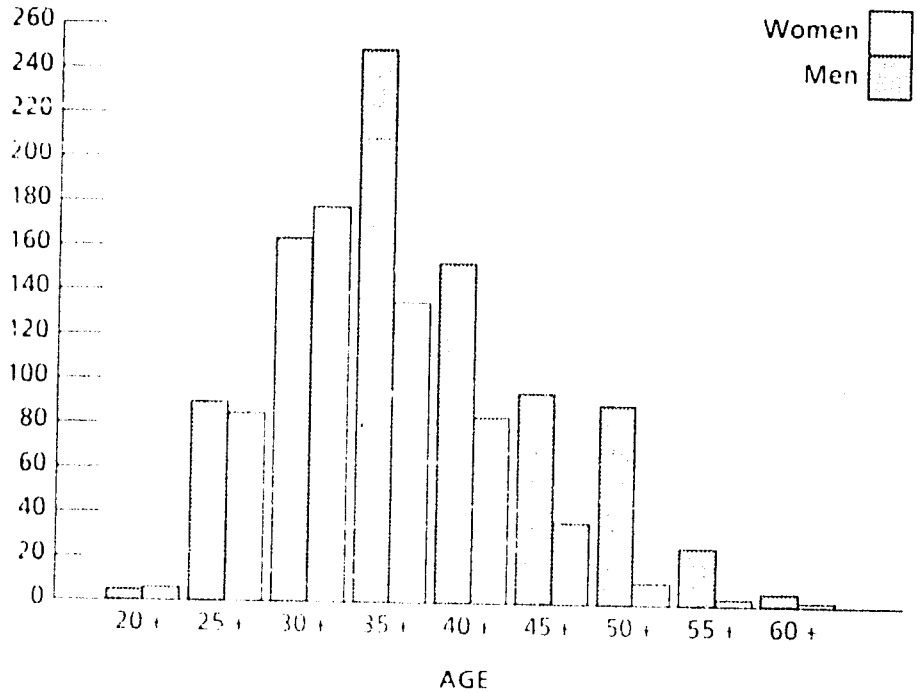
The graph below shows the current age distribution of scientists at one research institute.

For the recruitment planner, this graph should cause concern. There is clearly a bulge in the middle. 58% of scientists are between ages 36 and 45.

Why are there not more young scientists? Most important, what will the age profile of this institute look like in ten years? Is there a danger that probable government restrictions on new recruitment, perhaps for budgetary reasons, will mean that the age distribution will increasingly become an inverted pyramid? How might such an inversion affect promotions? Might some scientists choose to leave the NARS because their promotions are blocked?



This graph shows the current age and sex distributions of scientists in one NARS.



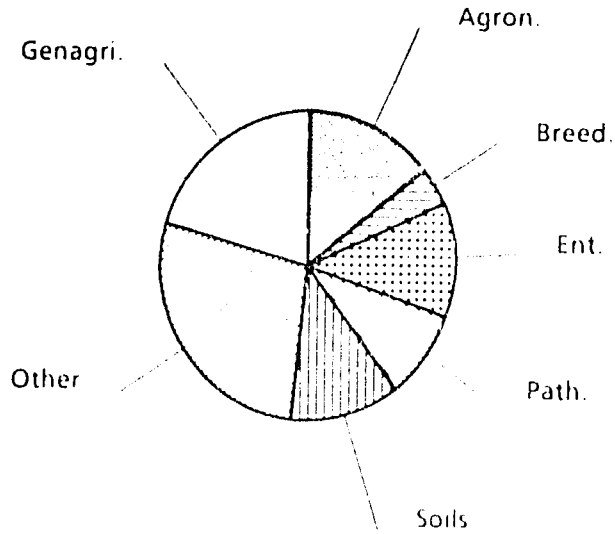
For the recruitment planner, the most striking characteristic of this graph is the high percentage of women (38%). Many of these women are young – 50% of them are under 35, as compared with only 20% of men. Even in absolute terms, there are more women under age 35 than men (269 vs. 259). Recent recruitment has been biased in favor of the most able young scientists – who, in this NARS, have been mostly women.

If such trends continue, the percentage of female scientists will most likely have grown to at least 44% by 1994. Such a figure is likely to be important, as it affects postings and disciplinary balance (and therefore the type of research actually done).

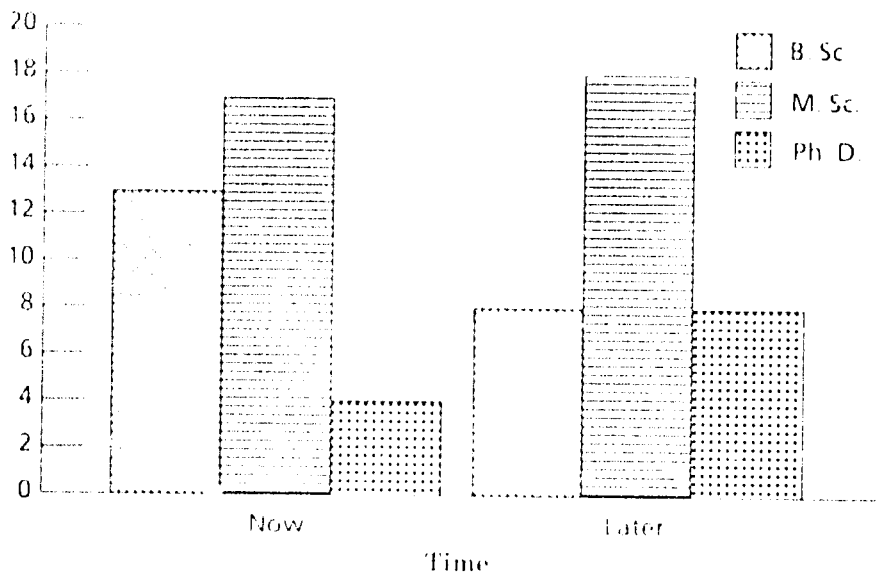
For the planner, the dilemma is clear. If more women are recruited, the NARS may have problems in assigning them to rural areas. But if preference is shown to men, the new recruits may not be the most able available scientists.

Training Planning

The pie chart on the next page shows the distribution of M.Sc. and Ph.D. scientists by discipline in one NARS. Such data are useful to both recruitment and training planners. What disciplines are under – and over – represented?



The bar graph below shows the distribution of scientists by educational qualification at one research institute -- as well as the distribution after current trainees have returned.

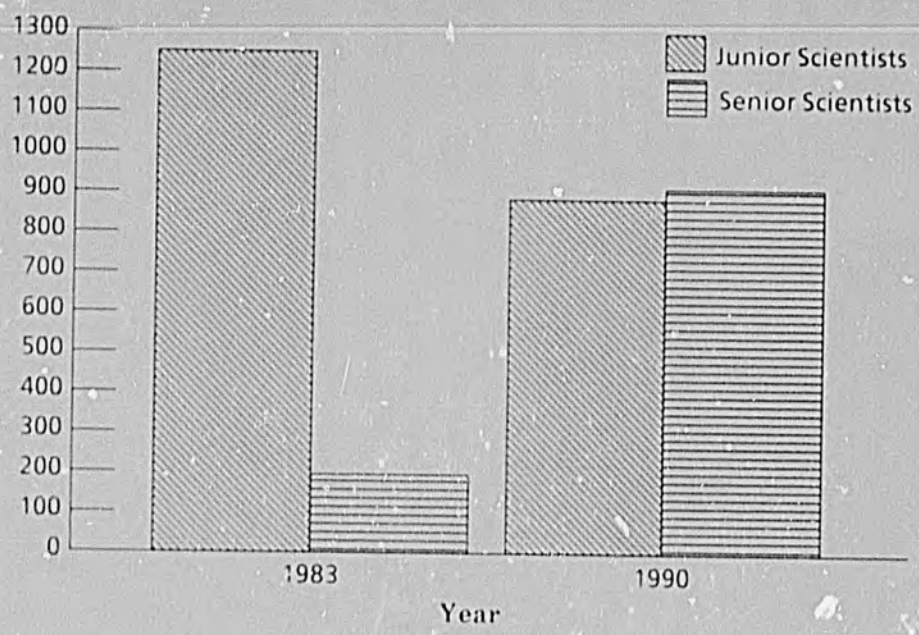


For the training planner, the "later" portion of the graph should be particularly worrisome. Will 8 Ph.D.s (24% of the scientific strength of the institute) have sufficient research funds and subordinate personnel to do efficient and effective research? Will there be scope for M.Sc.s to aspire to become Ph.D.s

without beginning to invert the professional staff pyramid? And might B.Sc.s increasingly come to be regarded simply as "super technicians".

Career Planning

This graph shows the distribution of scientists in one NARS by grade in 1983 and in 1990.



The ominous feature of the graph is the changing balance between junior and senior scientists. In 1983, the ratio was more than 6:1. But by 1990 -- because of limited recruitment and largely automatic promotions (on the basis of seniority) -- there will actually be more senior than junior staff. The personnel pyramid will have become top-heavy.

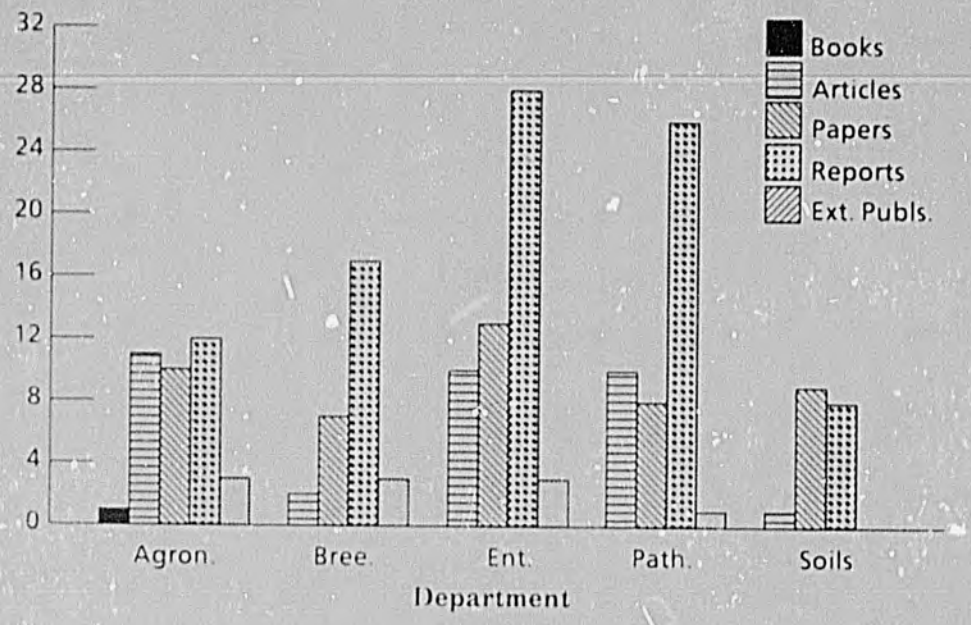
What might the research manager do to deal with this situation? A first step could be to get agreement on the ideal shape of the NARS staff pyramid, and to specify what percentage of staff should be at each grade level. A second step could then be to develop job descriptions and to specify the criteria for movement between grades.

Personal Evaluation

The last bar graph, on the next page, shows the published output of scientists by department in one research institute.

Both the institute director and the department heads might use such data in the evaluation of their personnel. Why are some departments apparently more productive than others? Is the balance between books, articles, papers, reports, and extension publications the right one?

Further -- since these data are aggregated from individual scientist data -- which scientists are writing the most? Are those scientists who do write the most really the most valuable and productive members of the research team? What other criteria for evaluation should be considered?



IX. CONCLUSION

The above examples illustrate how a HRIS can be used to generate data on four of the basic human resources management functions (pp. 5-7). Recruitment planning, training planning, career planning, and personal evaluation are at the center of good human resources management. Such functions cannot be performed in the absence of information. *GOOD DATA ARE ESSENTIAL PREREQUISITES FOR GOOD DECISION-MAKING.*

This paper provides a *CHECKLIST* of decisions a NARS manager responsible for building a HRIS must take. It contains few prescriptions. Each NARS is different -- and each NARS manager operates in his/her own political and organizational environment. The emphasis in the paper is therefore on issues rather than on solutions.

(1) Strategy (pp. 1-3).

Agreement on the place of a HRIS in a wider management information system.

(2) Content (pp. 5-7).

Definition of priority HR management functions to be performed (p.5). Eight listed.

Identification of basic information required to perform these functions (pp. 5-7). Fourteen suggested variables.

Importance of beginning small.

(3) Data Collection and Updating (pp. 7-9).

Identification of sources of information (pp.7-8). Personal files vs. surveys. National headquarters vs. institutes/stations.

Determination of efficient methods to collect and update information (p. 8). Personal files. Distribution and frequency of questionnaires, and incentives for scientists to fill them out.

Planning for personnel and non-personnel costs of data collection and updating (p.9). Travel, training, and microcomputers.

(4) Data Management (pp. 10-12).

Identification of an organizational "home" for a HRIS (pp.10-11). The personnel division, the planning division, an MIS unit, the data processing division.

Agreement as to how centralized or decentralized HRIS operations are to be (pp. 11-12). Data checking, data entering, data security.

(5) Data Use (pp. 12-17).

Establishment of procedures to encourage use at both the national and institute/station levels.

Examples of data use for recruitment planning, training planning, career planning, and personal evaluation (pp. 13-17).