QUANTITATIVE ASPECTS OF RECRUITMENT PLANNING FOR NATIONAL AGRICULTURAL RESEARCH: A METHODOLOGICAL NOTE

Byron MOOK

International Service for National Agricultural Research
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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.

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Quantitative Aspects of Recruitment Planning for National Agricultural Research: A Methodological Note

Byron Mook

Introduction

How do research managers go about estimating the future manpower needs of their organization? How many scientists and managers will they need (quantity) and what kinds of people should they be (quality)?

The focus of this note is on quantity issues. The objective is to present a practical and powerful method for the manager to deal with the numerical aspects of recruitment planning. Potential users of this method include senior officials of national agricultural research systems (NARS), including those officials specifically charged with the management of scientific personnel.

General Considerations

The process of recruitment planning has five general steps. Each is presented below in the form of a series of questions for the research manager. The manager cannot logically move onto the next step until the question(s) for the previous one have been answered.

1. The Determination of Program
   a. What is my organization trying to accomplish?
   b. What are our research priorities?

2. The Identification of Manpower Needs
   a. What personnel do I need to implement these programs?
   b. What different mixes of scientific staff and support staff could I employ to meet these goals?

3. The Analysis of Existing Manpower Supply

   a. What personnel do I have now?
   b. Who will be retiring in the next five to 10 years?
   c. What new skills do I need?

4. The Choice among Alternatives
   a. Can I meet these skill requirements by upgrading the qualifications of existing staff (in-career training)?
   b. Or do I need to bring in new people?

5. The Match between Manpower and Money
   a. How much will whichever alternative I choose cost?
   b. And am I likely to have the funds?

In many NARS, the manager may find it difficult to answer such questions. Program priorities may not have been defined (no. 1) and the information base on existing personnel may be weak (no. 3). Training opportunities are often unclear (no. 4) and levels of future funding almost always are (no. 5).

In such situations, managers obviously have to do the best they can. For dealing with quantity issues in recruitment planning, managers have two options, which are politically and, even to some extent, philosophically different. The first is an approach based on what they would like—and the second on what they can afford.

Approach No. 1 — "Wish Lists"

The first approach is the one most commonly used. Its starting point is a request by the manager to heads of research

1. Paul Bennett was a major contributor to the ideas presented in this paper.
institutes or programs to state their manpower “requirements” over the next x number of years.

- How many people do you need?
- Of what type?
- What kinds of qualifications should they have?
- In which scientific fields?

This approach is easy to follow but has two problems: (a) imprecision about the concept of “requirements” and, as a result, (b) a tendency to state “requirements” too high.

Let us examine the second problem first. . . . There are at least four reasons for the tendency of agricultural research managers to overestimate.

1. **Budgetary strategy.** Institute or program managers asked to state their manpower requirements usually feel that whatever number they give will be cut anyway. They therefore overestimate in the hope that they will finish with resources close to what they think they may actually need.

2. **Agricultural research in national development.** Most research managers believe that their scientists have a unique potential for making contributions to the nation. Their argument is that the economy depends on agriculture, and that agriculture depends on agricultural research.

3. **Professional status.** Research managers also tend to feel that they represent an elite group. Agricultural scientists are better educated than the majority of the national population, more widely travelled, and better paid. In order to maintain such status — so the (usually unstated) argument goes — research leaders must continually strengthen their organizations with more and better people.

4. **Empire building.** Some research managers equate numbers of subordinates with bureaucratic power. The more employees, the bigger the budget, the greater the influence.

All four such arguments are undoubtedly valid. But the managers who follow this first approach and make overestimates — often for good political and administrative reasons — seldom take sufficient account of the general considerations outlined in above. Their list of “requirements” is usually based on a less than thorough analysis of program (no. 1), job descriptions (no. 2), available manpower (no. 3), training opportunities (no. 4), or likely funds available (no. 5).

In such cases, the result is simply a wish list for new manpower rather than any kind of a systematic recruitment plan. But the costs of such management shorthand may be high . . . If NARS recruit either too many people, and/or people who are too highly qualified, the manager is likely to have to deal with several interrelated problems.

1. **Lack of resources.** Most NARS now put at least 60% of the recurrent funds they receive into personnel. Many put more — and the salary bill is continually growing. If too much money goes into salaries, because too many highly qualified people have been recruited, there will obviously not be enough for actually doing research.

2. **Lack of motivation.** Without sufficient operating resources (including support staff, materials, and facilities), newly recruited scientists will not be able to do the work for which they have been trained. They will therefore become frustrated — and either become inactive or begin to look for alternative employment elsewhere.

3. **Lack of organizational coherence.** Finally, if a research organization recruits too many highly qualified personnel, it may develop what is sometimes called an “inversion of the skill hierarchy.” In plain terms, the organization becomes top-heavy, with too many self-perceived leaders (senior scientists) and not enough followers (junior scientists and support staff).

**Approach No. 2 — “What Can We Afford”**

**Basic elements**

The second approach is the primary focus of this methodological note. This approach is sounder from both a management and an economic point of view. It asks not “how much is needed” (as in the first approach), but rather “how much can we afford?” In a time of tight budgets and financial austerity, all research managers need to be asking this latter question.

In order to use this method, the research manager needs five types of data. These data are not complex and can usually be put together by the manager’s staff with a minimum of effort.

1. **AGDP (Agricultural gross domestic product)** for the current fiscal year and with estimates of growth in the period for which recruitment is being planned.

2. **AGDP being spent on agricultural research** for the current fiscal year and — again — with estimates of growth in the period for which recruitment is being planned. Most NARS now get about 1% per year;
some international agencies have set targets for NARS of 1.5%-2% per year.

3. Bill for research salaries/benefits expressed as a percentage of total research expenditure. As noted above, this figure in most NARS is at least 60% and is often closer to 80%.

4. Bill for salaries/benefits of graduate scientific staff (a derivative of no. 3). This is also expressed as a percentage of total research expenditure. When coupled with an analysis of the spread between salaries paid to different categories of personnel, this figure gives an indication of the shape of the personnel pyramid.

5. Movement of graduate scientific staff into higher salary grades over the period for which recruitment is being planned, called "grade creep." Even if a research organization does no recruitment at all in a given year, its salary and benefits bill will go up simply because of increments and promotions.

An illustration of the method from one NARS — Data

To illustrate the use of this approach in recruitment planning, a "real-life" example is appropriate. The data presented below are from one NARS.

1. **AGDP.** In 1981, AGDP was the equivalent of USS730,080,000. The government was optimistic that AGDP was going to grow at an annual rate of 4% over the next decade. But some nongovernment economists were unconvinced; they believed that such an estimate was very optimistic and argued that a more realistic AGDP growth rate was closer to 2%.

2. **Percent of AGDP being spent on agricultural research.** In 1981, this figure was 1.06%. Research planners hoped that the figure would rise closer to 1.5% within three to five years. But Ministry of Finance officials were publicly noncommittal and privately pessimistic about such an increase. Some even wondered whether the 1.06% level could be maintained in the face of increasing debt-service, military, and social-welfare pressures.

3. **Total bill for research salaries/benefits.** In 1981, this figure was the equivalent of USS5,423,000. Such a figure represented 70% of the operating (recurrent) expenditure budget.

4. **Total bill for salaries/benefits of graduate scientific staff.** In 1981, this figure was the equivalent of USS1,472,000 — or 19% of the operating expenditure budget. The NARS had about 550 BAs, MScs, and PhDs.

5. **Movement of graduate scientific staff into higher salary grades.** In 1981, planners estimated that the annual increased financial cost of "grade creep" was 3%.

An illustration of the method from one NARS — Future scenarios

The payoff from the method described above comes in the ability of the manager to ask and answer "what-if" questions. What if AGDP does in fact grow at 2% instead of 4%? What if the percent of AGDP spent on agricultural research does indeed rise to 1.25%?

The basic question the manager is trying to answer is "How many more people will I be able to recruit while still keeping enough operational funds for research?"

Let us use the above data to construct three such what-if scenarios...

<table>
<thead>
<tr>
<th>Scenario</th>
<th>AGDP Growth</th>
<th>Percent of AGDP on Agricultural Research</th>
<th>Total Bill for Research Salaries/Benefits</th>
<th>Total Bill for Salaries/Benefits of Graduate Staff</th>
<th>Movement of Graduate Scientific Staff into Higher Salary Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>4%</td>
<td>1.06%</td>
<td>70%</td>
<td>19%</td>
<td>3%</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>2%</td>
<td>1.06%</td>
<td>70%</td>
<td>19%</td>
<td>3%</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>2%</td>
<td>1.25%</td>
<td>70%</td>
<td>19%</td>
<td>3%</td>
</tr>
</tbody>
</table>

In this scenario, we see that the total number of graduate scientists that can be added to the research organization is 253 — an increase of 25 to 30 (or about 4%) per year. The figures in the bottom row of the table are net; that is, they represent the total of both recruits and retirements-plus-resignations.

Now let us suppose, however, that the manager starts from the other end. Suppose he decides that an annual growth of 25 to 30 scientists is not enough, and that 50 to 70 is much more desirable. What resources will be required to pay for such people?

2. In the real world, the 25-30 figures were in fact very disappointing to the managers of the NARS concerned. When they had earlier asked institute and program heads for "wish lists" (see the description of approach no. 1), the aggregate annual growth figures had actually been in the range of 50 to 70!
**Table 1.**

<table>
<thead>
<tr>
<th>ASSUMPTIONS:</th>
<th>4%</th>
<th>AGDP Growth</th>
<th>19%</th>
<th>Graduate Salaries/Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.06%</td>
<td>Percent of AGDP for Research</td>
<td>3%</td>
<td>Grade Creep</td>
</tr>
<tr>
<td></td>
<td>70%</td>
<td>Total Salaries/Benefits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGDP based on 4% annual growth</td>
<td>730800</td>
<td>760032</td>
<td>790433</td>
<td>822051</td>
</tr>
<tr>
<td>Total NARS oper. budget based on 1.06% of AGDP for research</td>
<td>7746</td>
<td>8056</td>
<td>8379</td>
<td>8714</td>
</tr>
<tr>
<td>Total staff sals/benefits based on 70% of oper. budget</td>
<td>5423</td>
<td>5639</td>
<td>5865</td>
<td>6100</td>
</tr>
<tr>
<td>Graduate sals/benefits based on 19% of oper. budget</td>
<td>1472</td>
<td>1531</td>
<td>1592</td>
<td>1656</td>
</tr>
<tr>
<td>Reduction in real graduate salaries/benefits based on 3% annual grade creep</td>
<td>1486</td>
<td>1546</td>
<td>1607</td>
<td>1672</td>
</tr>
<tr>
<td>Number of graduates at 2500 (constant)</td>
<td>594</td>
<td>618</td>
<td>643</td>
<td>669</td>
</tr>
<tr>
<td>Net increase in graduates/year</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
</tr>
</tbody>
</table>
Table 2 shows a 10-year projection based on these more ambitious growth assumptions:

1. **AGDP. 4% annual growth.**

2. **Percent of AGDP being spent on agricultural research.** Growth in the current 1.06% figure to 1.46% by 1991 (in annual increments of 0.04%).

3. **Total bill for research salaries/benefits.** Maintenance of the current 70% figure.

4. **Total bill for salaries/benefits of graduate scientific staff.** Maintenance of the current 19% figure.

5. **Movement of graduate scientific staff into higher salary grades.** 3% per annum.

In this scenario, the total number of graduates that can be added to the research organization is 549 — a much more desirable result. But the assumption that makes this figure possible — a substantial growth in the percent of AGDP being spent for research — is very optimistic.

Finally, let us suppose the dependent variable is changed from the number of scientists that can be recruited to the percent of budget being spent on salaries/benefits. 

Table 3 shows a 10-year projection based on the following assumptions:

1. **AGDP. 4% annual growth.**

2. **Percent of AGDP being spent on agricultural research.** Maintenance of the current 1.06% figure.

3. **Average cost per scientist.** 6% annual growth. This figure takes account of both grade creep (3%) and upward revision of civil service salary scales (3%).

4. **Number of scientists.** 5% annual growth.

In this scenario, the percent of recurrent budget being spent on salaries/benefits by 1991 is 99%. In order to avoid such a disaster, the manager has to be able to show that the one of the above four variables is wrong. Either AGDP has to grow more, or more has to be spent on agricultural research, or the average cost per scientist has to grow less, or the number of scientists has to grow less. How much room for maneuver is there?

**Conclusion**

The focus of this brief methodological note is on a single management procedure. The objective is to put before research managers a practical technique that they and their staffs can use to plan the quantitative aspects of scientist recruitment.3

The attractiveness of the technique is that its use encourages research managers to take account of financial constraints. For NARS, the most critical moment in the recruitment process is when policymakers in the ministry of planning and/or in the ministry of finance and/or in the public service commission make decisions about the personnel plans formulated by the NARS. The major assumption of this note is that such policymakers are more likely to provide increased staff resources for research when they can base their decisions on well-researched, well-documented, and well-argued cases. "Wish lists" are not likely to be sufficient.

**A Note on Microcomputer Use in the Application of the Method**

The three tables included in this paper were put together using a basic spreadsheet program on a small microcomputer. A spreadsheet is simply a matrix consisting of rows (horizontal) and columns (vertical). Numbers are entered in the appropriate cells in the matrix, rows and columns are summed, and an overall total is calculated. Financial managers and accountants have used spreadsheets for years.

Before the advent of microcomputers, however, spreadsheet recalculations were usually tedious and time-consuming. Whenever the value in one cell in the matrix was changed, all row and column totals also changed. The amount of addition and readdition was therefore often very large.

With a simple microcomputer, however, such recalculations become instantaneous. When the manager changes a value in any one cell in a matrix, values in all other cells are recalculated automatically. The advantage for a research manager of using a spreadsheet for functions other than finance — e.g., for recruitment planning, as described in this paper — are obvious. The manager can ask "what-if" questions and can experiment with different scenarios. Tables 1 and 2 in this paper have the same structure but are based on different "what-if" assumptions.

3. For a summary of the more theoretical aspects of recruitment planning, see ISNAR Working Paper No.15, **Human Resource Management for Agricultural Research: Overview and Issues**, by Paul Bennell and Larry Zuidema.
| Table 2. |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| **ASSUMPTIONS:** | 4% | **AGDP Growth** | 19% | **Graduate Salaries/Benefits** |
| 1.06% - 1.46% | **Percent of AGDP for Research** | 3% | **Grade Creep** |
| (0.04% annual growth) | | | |
| 70% | **Total Salaries/Benefits** | | |

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<td>822051</td>
<td>854933</td>
<td>889130</td>
<td>924695</td>
<td>961683</td>
<td>1000150</td>
<td>1040156</td>
<td>1081763</td>
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<tr>
<td>Total NARS oper. budget based on 1.06% of AGDP for research in 1981, rising by 0.04% annually to 1.46% in 1991</td>
<td>7746</td>
<td>8360</td>
<td>9011</td>
<td>9700</td>
<td>10430</td>
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<td>1018</td>
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<td>Net increase in graduates/year</td>
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<td>76</td>
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## Table 3.

<table>
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<tr>
<th>ASSUMPTIONS:</th>
<th>AGDP Growth</th>
<th>Percent of AGDP for Research</th>
<th>Annual Growth (Cost/Scientist)</th>
<th>Average Annual Growth (Numbers of Scientists)</th>
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<tbody>
<tr>
<td>4%</td>
<td>1.06%</td>
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<td>6%</td>
<td>5%</td>
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<td>758</td>
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<td>62%</td>
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<td>81%</td>
<td>87%</td>
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