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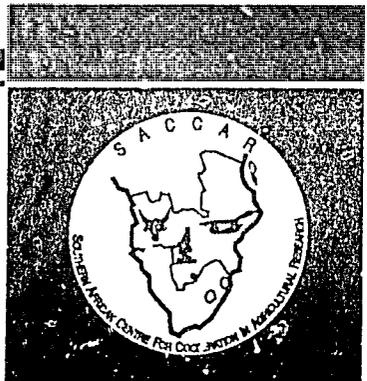


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PERFORMANCE ASSESSMENT FACTORS FOR AGRICULTURAL RESEARCHERS

Larry Zuidema

Managers are responsible for the performance of staff to the extent that they have the policy options and mechanisms to select, motivate, and support them. One such mechanism is performance management, which includes mutual understanding and agreement, joint planning of activities, continuous and timely feedback, observation, and appraisal. The focus of this paper is on performance planning and appraisals with particular attention to assessment factors appropriate for agricultural researchers.

Performance planning and appraisal serves both the organization and the researcher. For managers, it provides essential information for planning the future use of human resources. For researchers, it can be decisive in improving and maintaining motivation and even creativity.

The process of *performance planning* involves (1) a prior and periodic elaboration of individual goals to be achieved in relation to program goals and (2) the establishment of criteria by which specific aspects of the achievement of researchers' goals can be measured. *Performance appraisal* involves a periodic and mutual assessment of actual performance in relation to desired (planned) performance. It offers the opportunity to review researcher, management, and organizational factors that may influence researcher performance.

Performance appraisals of agricultural research staff are vital to the maintenance of effective research programs. First, they motivate researchers toward the goals of the research organization by communicating its culture, values, and expectations. Second, they are the basis for personnel actions such as work assignments, promotions, rewards, transfers, and training.

The process of researcher appraisal is usually governed by the codes and procedures of the institutions conducting agricultural research. For those in ministries and departments of agriculture, civil service regulations (which may or may not be related to scientists) usually apply. In a university setting, tenure and promotion guidelines prevail.

In either case, research managers need to evaluate these procedures for management purposes and develop complementary procedures when necessary.

This paper reviews what factors influence performance, what assessment strategies have been employed, and why assessments are made. A major section is devoted to a review of what researcher performance assessment factors (criteria) are used. The material in this paper comes from a small sampling of appraisal forms and procedures used by several NARS throughout the world as well as a review of reports about performance appraisal systems in research organizations.

What Factors Influence Performance?

Any system that is used to assess researcher performance must take the influences of both the individual researcher and the organization itself into account. Performance assessment procedures need to make clear distinctions between and allow for consideration of the following factors which influence performance:

1. **Researcher attributes** — Researcher attributes include the personal characteristics and traits that contribute to the behaviors and attitudes of the researcher. Many civil service appraisal systems focus on these characteristics and traits.
2. **Researcher knowledge and skills** — Researcher knowledge and skills include the technical knowledge resulting from education and experience and the professional skills achieved through training and experience.
3. **Organizational policies and procedures** — These are personnel policies (including compensation) that influence motivation and organizational procedures and set the conditions for the work environment can have significant influence on researcher performance.

4. **Management and support services** — This includes the level of financial support for important inputs for research, primarily technicians, and it is critical to the performance of researchers.
5. **Program opportunities and activities** — The mandates and defined programs of the research organization set the limits for researchers and form the basis for allocation of resources.

Figure 1 shows the components of agricultural researcher performance assessment and demonstrates the relationship of these five factors to the results and impact of research efforts. The inputs are the researchers (personal attributes, knowledge, and skills), organizational policies and procedures, and management and support services. These inputs are applied to the processes that correspond to the program activities of researchers. The activities result in outputs and eventually outcomes. It is important to note that performance assessments can and often do take account of all of these components.

What Strategies Are Used?

The nature of the organization and its institutional framework usually influences performance assessment strategies. As one looks at the various approaches or strategies that have been employed in assessing the performance of researchers, the following characterizations can be made:

1. **Employment and autonomy** — This approach is to hire very selectively and then let researchers alone to do the job for which they were hired. The rationale is that creativity requires freedom from administrative controls and procedures. In effect, this justifies the ab-

sence of a performance management system. Appraisals are not conducted unless the situation is clearly a serious problem. The problem with this strategy is that many national research systems do not control the process of selection and there is often a small pool of qualified candidates for the positions offered. In addition, some NARS only recruit at the BS degree level and then provide opportunities for research degree training early in the researcher's career.

2. **Projects, not people** — This approach is to put the emphasis on peer assessment of project proposals and project results rather than direct researcher assessment. The rationale is that organizational objectives are met through projects and that this is the appropriate focus of evaluation. This too avoids the necessity of developing a performance management system. Appraisals are conducted only in crisis situations. The problem with this approach is that project reviews are infrequent and irregular with respect to timing and content. This is not conducive to good human resource management since it does not allow for discussions relating to progress and planning for future activities in relation to program goals.
3. **(Ap)praise and promote** — This approach focuses the performance assessment process entirely on the administrative requirements of the institution. The rationale employed is that the only reason for conducting appraisals is for promotions. This means that appraisals are conducted every three-five years, depending on the system's norms for career advancement. Normally such appraisals focus on the researcher's behavior and results that can be documented by administrators. In

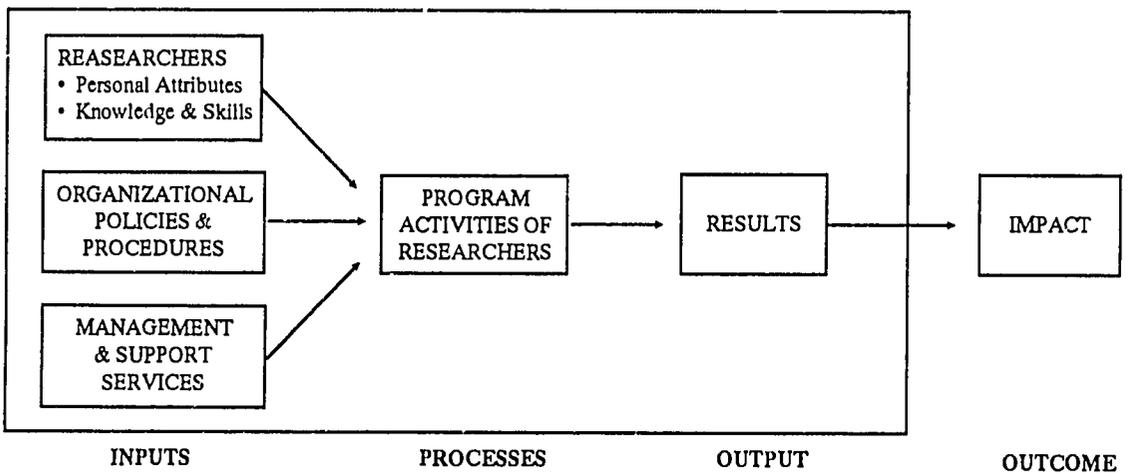


Figure 1. Components of Agricultural Researcher Performance Assessment

the case of university-based researchers, peer reviews are common. The problem with this approach is that the pressure to promote (praise) reduces the value of the exercise. Also, assessments with such a narrow goal, conducted infrequently do not permit effective researcher management.

4. **The annual ritual** — This approach also places high value on administrative requirements, but on an annual basis. Often the requirements and procedures are generic for all civil service employees and of low applicability to research institutions. The forms used most often stress evaluations of personal attributes and behaviors rather than activities and output. The major problem is that it is difficult to relate the process to program planning and evaluation. This is not a research management oriented process.
5. **Backward and forward** — The approach is to assess researcher activities and results of a past period against the program plans and objectives agreed upon for that period. Normally, the process includes agreement on and the establishment of individual goals and objectives for the next time period. The rationale is that researchers are best judged on individually planned performance since research is not a uniform activity. The appraisals are conducted annually in conjunction with overall program planning activities. While this is the currently favored approach for agricultural researcher assessment, one problem is that the tendency of those using the approach is to focus more on planning than on assessment of past performance. Also, it is not compatible with most civil service requirements.

Why Make Assessments?

With these strategies in mind, it is now appropriate to ask why it is that we make performance assessments of researchers. The following are the most cited reasons by research managers. These multiple reasons obviously influence both what is assessed and what processes are used to conduct the assessments.

1. **Basis for promotion and rewards** — The need for an equitable and fair system to allocate rewards and to maintain careers for researchers is often the prime motivation for appraisals. The procedures are often determined by civil service units and are out of the hands of research managers. In a few cases, special systems have been created for scientists. In still fewer cases, a level of autonomy has been reached which permits research institutions to establish their own systems for promotion and rewards.
2. **Develop researcher capacity** — An effective assessment process yields information about the need for further training of researchers. A desirable output from

the whole assessment process involves developing and up-dating a comprehensive training plan, both degree and nondegree. Both the organization and the individual benefit from this outcome of the assessment process.

3. **Improve motivation and performance** — The best outcome of a performance assessment process is a more highly motivated researcher with a desire for and capability to improve levels of performance. This will depend on the factors that are assessed and the process used. The process that reviews past performance against past plans and then proceeds to develop mutual and specific goals for the future will most likely succeed in improving motivation.
4. **Facilitate program and work planning** — Assigning researchers to priority research areas and programs requires an understanding of their current capabilities and commitments. Only if the assessment process includes an element of forward planning is it likely to contribute to effective program planning for the research organization. The accumulation of individual work plans is, de facto, the summation of program plans for the organization.

Another way in which one can answer the question of why we make performance assessments is to provide regular, organized, and periodic feedback to both researchers and managers. This is a more positive and constructive approach to performance assessment. It makes the whole process acceptable for all parties and changes the ambiance from a process to be dreaded and feared to a process anticipated and welcomed. In the end, the four reasons for conducting performance assessments remain, but the approach and process stresses feedback.

This process is designed to provide feedback to managers for (1) promotion and rewards, (2) staff development planning and counseling, and (3) program planning. Feedback to researchers would be for (1) self-development, (2) motivation, and (3) work planning. The concept of feedback is relevant to the content of the following section on what factors are assessed.

What Factors Do We Assess?

A review of instruments (forms) used for making assessments of agricultural researchers throughout the world shows that a wide variety of factors are included. Most forms, however, emphasize a few and utilize both rating scales and behaviorally oriented statements. The following are six factors that are used for assessing the performance of researchers. Each of these factors is reviewed in some detail and questions are raised for readers to contemplate and about which to draw conclusions in relation to their own system. Refer to figure 1 which shows the relationship of these factors to each other.

- | | |
|--|----------------------|
| 1. Personal attributes | what they are |
| 2. Technical knowledge | what they can do |
| 3. Professional skills | what they can do |
| 4. Professional activities and behaviors | what they do |
| 5. Outputs/results | what they accomplish |
| 6. Outcome/impact | consequences |

The first three factors may be considered to be predictors of performance. Activities and results are more direct measures of performance, while impact serves to validate and substantiate performance evaluated in some previous time frame. In reviewing the utility of these factors, it is important to think about their effectiveness in relation to the reasons given above for performance assessments. In particular, how do assessments of each of these factors relate to the achievement of program goals and objectives?

1. Personal attributes

Personal attributes (characteristics and traits) are usually measured on a graphic scale that is quantified and comparable but based on the general judgment of the rater. It is also possible to describe and rank personal attributes qualitatively. For example, the top ranking for "judgment" could be "outstanding ability for defining objectives, formulating programs, and evaluating results or trends from data and reports." The bottom ranking would be "requires assistance in evaluating results of his/her own projects." Combinations of qualitative and quantitative evaluations are also used to score personal characteristics. The criteria selected often reflect the organization's concept of the personality profile of a productive employee.

The following are several criteria that have been taken from performance appraisal forms used to evaluate personal attributes of researchers.

maturity	responsibility
motivation	accuracy
initiative	speed
integrity	imagination
cooperativeness	enthusiasm
decisiveness	self-reliance
judgment	drive
foresight	creativity
reliability	attitude
punctuality	resourcefulness
manners	personality
intelligence	loyalty
appearance	innovativeness

This is a wide spectrum of attributes, and most would agree that many are not appropriate for the evaluation of research staff. In fact, there is considerable doubt that performance assessments should include any reference to personal attributes at all. The following are some questions for contemplation. Which of these attributes are most critical for researchers? In particular, how important are those selected as contributors to actual performance? For those that are important, how do we assess them objectively? Furthermore, how much change in these personal attributes can managers stimulate?

2. Technical knowledge

Required knowledge is usually reflected in the job description for the position. Often, staff are hired with the required technical knowledge, and an evaluation occurs in the recruitment process. In other cases, generalists are employed at the BS level with the expectation that those worthy will be given the opportunity to obtain increased technical knowledge through degree and nondegree training on the job. Usually, it is expected that the employee will maintain and improve knowledge in technical areas. Therefore, it may be appropriate to periodically evaluate progress made against expected and planned improvements in technical knowledge.

Some examples of areas for assessment relating to technical knowledge include

1. educational qualifications
2. accumulated experience
3. continued degree study
4. participation in short-term training
5. involvement in on-the-job training activities

Most of these areas are best assessed upon entry to an organization, but they are also appropriate for reassessment at the time of consideration for a promotion or new assignment within the organization.

The following are some questions that are relevant to assessment of technical knowledge. Is education an accurate reflection of technical knowledge? Do high levels of technical knowledge ensure high levels of performance? What is the best way to proceed to assess levels of technical knowledge? At what point is investment in improving technical knowledge most beneficial to the organization?

3. Professional skills

In addition to technical knowledge, researchers are expected to possess skills that permit the effective use of knowledge in a research environment. Furthermore, it is expected

that researchers will improve these skills throughout their careers through experience and training. Some of the skills that are required of nearly all researchers are as follows:

1. oral and written communications
2. interpersonal relations
3. leadership
4. program management
5. supervision of staff
6. statistical analysis
7. organization of work activities

If the research organization values these skills, there must be a way to assess the level of their application by researchers and then to provide opportunities for improvement. Most of these skill areas can be observed and evaluated somewhat objectively.

Some relevant questions are as follows: What other areas can be identified? How important are professional skills to the job performance of researchers? How would one conduct skill evaluations? How much change is possible in a researcher's career?

4. Professional activities and behaviors

Many professional activities and behaviors contribute to output. Their assessment is particularly useful for program areas where output is infrequent or not easily measured. The following are professional activities and behaviors valued by agricultural research institutions:

1. keeping up with the scientific literature
2. ability to define research problems
3. ability to design, undertake, and interpret experiments
4. timely reporting of experimental results and conclusions
5. effective documentation for potential users
6. active participation in professional meetings
7. effective training of support and junior staff
8. collaboration with other researchers on teams
9. joint activities with extension workers

These and other activities and behaviors should be evaluated as a part of the assessment process since they convey what the research organization desires of its researchers. Some questions for consideration are as follows: What other activities and behaviors are desirable and important to evaluate? Do job descriptions adequately reflect expected and desirable behaviors and activities? What are the best ways to assess behaviors? How much change in researcher behavior is possible?

5. Outputs and results

Outputs and results are usually measured in gross terms such as "quantity of work" and "quality of work" and using graphic scales from "outstanding" to "poor." Normally, this is not sufficient for effective researcher assessment. Standards of performance are sometimes used to measure quantity and quality in terms of numbers, time periods, and expense. These objective measures may be reviewed in absolute terms against a set standard or in relative terms comparing output of similar staff.

For agricultural research, both objective and subjective measures of output are useful. In most cases, standards of performance should be directly related to a plan of work agreed upon as part of a previous performance planning and appraisal process. Both the plan of work and the standards of performance should take into account the capabilities of the researcher and be realistic in terms of time, financial support requirements, and institutional capabilities.

Researcher outputs/results evaluated by agricultural research managers include media output, plant varieties, prototypes, patents, etc. In the case of a journal article, it is important to evaluate the quality of the article as well as the publication in which it appears. Criteria for such an evaluation would include relevance, responsiveness, and utility for the national program. The following are some examples of researcher outputs/results:

1. scientific journal articles
2. books written and edited (including chapters)
3. research reports
4. research abstracts
5. conference reports and papers
6. extension publications
7. position papers
8. radio/TV/video tapes
9. news articles

10. designs released
11. patents received
12. varieties released
13. prototypes produced
14. proposals accepted

It is relatively easy to count these items. However, variability among the norms for specific positions and disciplines needs to be taken into account when evaluating quantity of output. But more important, the quality of that output needs to be assessed. Some important questions are as follows: Is it enough to make judgments from outstanding to poor? Is it possible to employ criteria like relevance, responsiveness, and usefulness? For client-oriented research, can we use adoption as a criteria for researcher appraisal?

5. Outcome/impact

The ultimate tests of the effectiveness of an agricultural research institution and its staff are client acceptance and adoption of researcher products. These are almost always observable only at some distant time and, in fact, may not be easily attributable to any one person. Nevertheless, the evaluation of researchers should include measures and criteria relating to outcomes and impact if they can be attributed and assessed.

Some examples of measures of impact are

1. honors and awards received (particularly from client groups)
2. widespread acceptance and adoption of a technology (e.g., a variety)
3. frequent citations of professional papers by other researchers

This third example is the subject of considerable research and debate since citations do not always correlate with quality. In all cases, the measures of effective impact should include considerations of relevance, responsiveness, usefulness, and cost-effectiveness.

Some questions about the assessment of impact are as follows: Can outcomes/impact be easily attributed to a single researcher? Do outcomes reflect program objectives? Does the technology favor one group at the expense of another?

Conclusions

This discussion paper has reviewed six assessment factors used to evaluate agricultural researchers. All have some utility in the process of evaluating researcher performance, but clearly, those that reflect output/results/products have a high value for managers. Why is it that other factors like personal attributes are retained in performance appraisal forms and procedures? Perhaps it is because we have not made the shift from evaluating predictors of performance required for researcher recruitment and selection, to actual activities and outputs required for effective performance assessments. Table 1 shows the relative usefulness of the six assessment factors for both selection and performance assessment.

An effective performance planning management process will provide enough information for management to take specific actions. It is important that all parties have reasonable expectations about the possibilities of actions resulting from the process. Further, it is important that managers communicate these actions effectively so that it is clear that the process is designed to actually improve the performance of the entire organization. Three types of management actions may be involved:

1. Those directed at the researcher, including transfer, promotion, training, awards, increases in compensation, etc.;
2. Those required of management, including provision of supplies, improved facilities, more technicians, etc.;
3. Those required of program planners such as the incorporation of individual plans into the overall plans of the organization.

These actions are the primary means by which human resources are guided to achieve program objectives, and they serve as the basis for future increases in researcher productivity. Performance management systems that emphasize both performance planning and assessment offer the best opportunity for motivating researchers to meet program objectives.

Table 1. Agricultural Researcher Performance: Usefulness of Factors for Selection and Assessment

Assessment Factors	Researcher Selection	Performance Assessment
Personal Attributes	M	L
Technical Knowledge	H	M
Professional Skills	H	M
Professional Behaviors & Activities	M	H
Products/Results	L	H
Impact	L	H

KEY: *L* = Low, *M* = Medium, *H* = High.

LESSON: We need to make a shift from predictors of performance required for selection to actual activities and output required for performance assessment.