WORKING PAPER No. 25

AN ANALYSIS OF HUMAN RESOURCE CAPABILITIES AND CONSTRAINTS IN INIAP, ECUADOR

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International Service for National Agricultural Research

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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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1. These papers are intended to be a rapid means of presenting the results of work and experiences that are still in progress, but are already producing results that could be of use to others.

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.

ACKNOWLEDGEMENTS
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Table of Contents

Introduction

The purpose of this paper is to describe the human resource aspect of ISNAR's collaboration with the Instituto Nacional de Investigaciones Agropecuarias (INIAP) in ISNAR's June 1988 mission to Ecuador. Current collaboration is following the 3-stage process described in ISNAR's strategy document, entitled "Working to Strengthen National Agricultural Research Systems". The three stages are: diagnosis of system constraints; planning system-building strategies; and implementing system-building programs. These process stages, along with key actors, activities, and products of each of the stages are illustrated in Figure 1.

This paper discusses ISNAR's preparation and completion of the human resource component of stage one - diagnosis of system constraints. The first section of the paper describes the preparation for the Human Resource (HR) component of the mission in which background (to the Ecuadorian case) was reviewed, a methodology for HR analysis was designed, and a survey instrument was prepared to collect HR information. The second section presents the information that was collected and incorporated into the mission report. Since ISNAR is developing a workplan for stage 2 with the Ecuador National Agricultural Research System (NARS), the document is still in draft form. As such, the recommendations representing the product from stage 1 for the human resource section are preliminary.

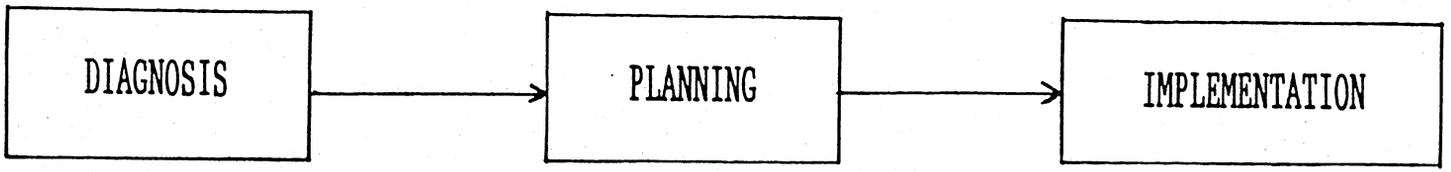
Section I: Ecuador: An Overview

According to a Consultative Group study, Ecuador is a small country in the initial stages of the development process (Posada Torres 1986:1). Its socioeconomic characteristics as such are as follows:

* high, sustained population growth rate - 3.4% over the last 15 years;
* dependency ratio over 100, since over 50% of the population is under 15 years old;
* large but diminishing proportion of the population living in rural areas - from approximately 67% in 1961 to 45% in 1988, due to urban migration;
* underemployment is estimated at 40%;
* large proportion of the agricultural sector living on subsistence agriculture in a smallholding situation
  - in the 1974 INEC Agricultural Census 61% of the production units were less than 5 hectares,
  - this 61% constituted less than 7% of the land in production.

In addition, despite the fact that it supports approximately 50% of the population, the agricultural sector receives only 5% of the budget for development. Even during the recent growth years, due to an "oil bonanza", agriculture grew at less than 3% per year.

Figure 1: ISNAR/NARS 3 - Stage Partnership Process



Actor	- ISNAR - NARS Collaborate	- ISNAR/NARS Partnership	- NARS - ISNAR: Backstop Catalyst
Activity	- Broad-based system review - Specific process, policy, or organization review	- Strategy developed - Priorities Set - ISNAR overview and breadth NARS Local interpretation	- Adapt and institutionalize management procedures
Product	- Recommendations	- Operational strategy supported by adequate evidence - Development of work plans	- Incremental build-up of system's capacities - More effective and better-managed research systems

Three reasons were identified for this relative stagnation in the agricultural sector:

1) The growth period was accompanied by inflation that averaged 13% from 1974 to 1982. In order to keep food prices low, the government supported imports rather than domestic production. The result of this policy is that over 90% of the wheat consumed is imported. Since this policy was dependent upon foreign exchange reserves due to the oil boom, it could not be expected to last.
2) Food preferences changed as income levels of the middle class increased. Items such as meat and wheat bread replaced traditional maize and potatoes, thus further eroding the traditional domestic market.
3) As demand for urban labor for construction and manufacturing increased, the labor supply for agriculture diminished.

Thus in the 1980s, with the end of the "oil bonanza", the traditional sector of agriculture has a diminished capacity, the middle class has a consumer preference for imported products, urban population has increased dramatically, and a considerable share of the working force has shifted from agriculture to other sectors.

Instituto National de Investigation Agropecuria (INIAP)

INIAP is operating against this backdrop of problems. INIAP was established in 1959 and began operations in 1961. The organization was charged with the responsibility of organizing and executing "... a national research system to improve the productivity of Ecuadorian agriculture" (Moscardi et al 1988:3). Specifically, the major activities to accomplish this task are as follows: 1) genetic improvement, such as new varieties that have higher quality and yield; 2) cultural improvement, such as better suitability for planting, cultivating, etc.; 3) plant health control; and 4) livestock research, including management practices, as well as species improvement (see Posada Torres). While INIAP had a dynamic growth pattern during the oil years, for the period of 1974 to 1982 it has experienced a "real" budget decline of 3% per year. The "real" budget for 1982 was 38% lower than its 1974 budget (Posada Torres 1986:24). The contention of this report was that many highly qualified staff had left for private enterprises or international organizations, it was difficult to discern whether those replacing them had equal qualifications, and those researchers who remained increasingly devoted more of their time to administrative tasks.

In terms of the scientific capability that is available to the NARS, Table 1 illustrates the growth pattern by educational level of INIAP.

The expenditure per scientist in agricultural research in Ecuador is below the average of other countries in the Andean region, but the intensity ratio of .54 and the qualification index of .30 are mid-range and average. Expenditure per scientist and the intensity ratios for Ecuador exceed those for all Central American countries and follow only Panama in the qualifications index (see Table 2).

In the southern region, Ecuador's indicators lag considerably behind Brazil, Chile, and Paraguay. In addition, Ecuador lies below other NARS and World Bank standards in qualifications on a global basis.

The primary problems faced by INIAP are:

* Funding - In addition to the general stagnation described above, the share of the total governmental budget set aside for the agricultural development budget has been decreasing (less than 5% in 1983).

Table 1: INIAP Scientific Community

	1965[1]	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1985
PhD						5	5	5	5	5	6	4	5	5	5	5	4	5
MSc						38	38	38	39	36	51	49	54	55	58	67	67	67
BSc						114	115	117	134	147	119	147	117	117	169	163	162	153
Total	34	54	94	123	158	157	158	160	178	188	176	200	176	177	232	235	233	225

1) Information from 1966 - 1969 was not available.
Source: ISNAR Agricultural Research Indicator Series: A Global Data Base on National Agricultural Research Systems. Pardey and Roseboom, CUP. 1989.

Table 2: National Agricultural Research Resources: expressed as 1980-1985 averages

COUNTRY	(1) Personnel	(2) Ag.Res.Expd.	(3) Ag.Res.Expd.	(4) ARI	(5) Qualification Index
Andean Region					
BOLIVIA	107	3.36	30	0.22	0.30
COLOMBIA	448	46.09	106	0.36	0.51
ECUADOR	209	14.06	69	0.54	0.30
PERU	265	18.66	52	0.56	0.12
VENEZUELA	383	40.37	91	1.01	0.40
Total	1412	122.55			
Average			87	0.54	0.33

SOURCES:
1) Personnel and Agricultural Research Expenditures: Pardey, P.G. and J. Roseboom. "ISNAR Agricultural Research Indicator Series: A global data base on national agricultural research systems". International Service for National Agricultural Research, The Hague (unpublished draft version, 1988).

2) Agricultural Gross Domestic Product (AgGDP): UN. "Gross Domestic Product by Broad Economic Sector. "Office for Development Research and Policy Analysis of the United Nations Secretariat, Mimeo, 1988.

DEFINITIONS:
(2) Agricultural Research Expenditures (in millions of 1980 US$). Agricultural research expenditures were first deflated into constant 1980 local currency units using an implicit GDP deflator (UN, 1988) and then converted into 1980 US$ using PPP over GDP indices from Summers & Heston (1988).

(3) Agric. Res. Expds. per scientist = (Ag.Res.Expds/Personnel (in 1000's 1980 US$).

(4) ARI (Agricultural Research Intensity Ratio) = Ag.Res.Expenditures/AgGDP (in percent).

(5) Qualification Index: PhD+MSc/Total Scientists inclusive of expatriate personnel - assumed to hold a higher degree.

* Staffing - Despite overall growth in numbers of staff, there has been a steady loss of highly qualified personnel.

In addition, review of existing materials on human resources indicates the following specific planning and career development problems facing INIAP:

* Planning - According to external reviews, none of Ecuador's development plans includes needs "...for human resources in the agricultural sector" (Larrea 1984:41). Without a national strategic plan, a human resource strategic plan for agriculture has not been established. Thus efforts and accomplishments have been the result of individuals' concern rather than organizational or national commitments.

* Career Development -
  - salary differences between organizational levels are minimal
  - promotion is based primarily on seniority rather than merit
  - senior scientists are promoted into administrative categories, leaving a weakness in field research
  - there are no formal guidelines for evaluation of performance
  - there are few opportunities to obtain postgraduate degrees.

Prediagnosis Stage -- Development of Methodology

In response to a perceived need from ISNAR staff working with Ecuador, a survey instrument was developed to facilitate human resource analysis in ISNAR's country review and advisory services mission. The instrument was designed to collect information for two purposes: the first was to describe the characteristics and current use of human resources in the research system. The goal of this was to create a baseline set of information that planners and administrators could use for needs analysis for staffing projections and training. This taking stock or account of strengths and weaknesses of human capital in the organization is an essential feature of a strategic plan. The identification of the gaps between the present and the future strategies allows for planned change.

The second purpose was to identify attitudes, interests, and objectives that motivate INIAP researchers. The goal for identifying the attitudes and interests that drive people to continue despite limited salaries, promotions, and other opportunities was to facilitate continued motivation of the organization's limited but most valuable commodity; i.e., scientists.

The survey instrument was adapted for the Ecuadorian mission through a negotiated process including NARS representatives, ISNAR advisory services, and members of ISNAR's research section.

The instrument is divided into six sections. Section 1 collects demographic and educational information. This background information can be used both to create a planning document for human resource management and to provide control variables for analyzing data from subsequent sections.

Section 2 seeks information about work activities and career development. It contains questions about the type of work the researcher does, his/her future career plans, and perceived criteria for career advancement.

Section 3 collects information on research productivity and research beneficiaries.

Questions focus on the type and quantity of the research product and on the perceived actual and ideal research beneficiaries.

Section 4 looks at research objectives and resources. It contains questions about the adequacy and importance of resources for research, the importance of listed research objectives, limitations to research, and criteria used to measure research productivity.

Section 5 measures the number of researchers who are active in professional societies and meetings.

Section 6 identifies some difficulties that researchers have with management activities.

The survey results were stored and organized on a microcomputer using dBASE III+, a commercial database management software program by Ashton-Tate. One record in the database represents one complete survey form. Each field in the record corresponds to an item of data in the survey.

The survey information was summarized using standard dBASE III+ reports. For each NARS surveyed, individual records were summarized by institute. The tables generated include age distribution, educational discipline, agricultural research experience, and distribution of work activities. Percentages were calculated from the tables. Selected data were then entered into DB Graph, a graphics program by Microrim, in order to produce graphic representations of the data.

Section II: The Survey: Scientists: The Human Resource

"It has been posited that 'human resources are the basic determinants of the rate of development of science, technology and social institutions'" (Lacy et al. 1983:11). Human resources, in the form of scientists, provide the knowledge and expertise for scientific development. Recognizing this dictates that one of the most important functions of a national agricultural scientific research system is the development, retention, and continued motivation of a body of scientific professionals. It is therefore of critical importance that the scientists themselves be understood in order to understand the scientific enterprise. This understanding will facilitate decision-making on staff recruitment, selection, training, performance, motivation, and utilization of human scientific resources.

A number of essential questions must be answered in order for management to accomplish HRM functions effectively and efficiently. Objective questions include: who are the scientists? what do they do? where do they work? how do they work? Subjective questions include: how do they see their work environment? and why do they do what they do?

This section presents the responses of INIAP agricultural scientists to the survey instrument described above. The section includes illustrations of how this information can be analyzed and displayed, and a conclusion which includes a summary of the information. The questionnaire was completed by 148 researchers, representing 65% of the total NARS professional staff.

Demographic Profile

An examination of the demographic characteristics of the agricultural scientists reveals that their average age is 39 years with an age range from 21 years to 70 years.

This group of scientists has spent an average of 10 years in agricultural research, excluding their training. The distribution of this work experience is 21% with 5 years or less, 32% with 6 to 10 years, 33% with 11 to 15 years, and 14% with 16 years or more (Figure 2).

While women represent only 5% of the scientific population (a statistic that is consistent with data from other countries), they are distributed in a variety of disciplines. This diverges from previous studies of public-sector agricultural scientists, where women were concentrated in a limited number of sciences, such as nutrition, social science, and food science (Busch and Lacy 1983).

An examination of the educational level of the scientists indicates that 1% have obtained PhDs, 22% have obtained master's degrees, and 74% have either a bachelor's degree or local equivalent. The remaining 3% have other degrees, such as associate degrees (Figure 3). This level of education is considerably below the average levels found in a 32-country study of Third World nations, where 9% had obtained PhDs, 27% had obtained master's degrees and 64% had a bachelor of science or equivalent (Oram and Bindlish 1981).

Recently, the preliminary data from the ISNAR Agricultural Research Indicator Series Database on 79 countries show that 12% have obtained PhDs, 35% have a MSc, and 53% have a BSc, thus confirming the relatively low level of education in this NARS. In addition to being considerably below the international norm, the level of PhDs at only 1% is significantly below the 20% target proposed by the World Bank.

One strength of the human resource capability in INIAP is that the distribution of skills across age cohorts is equitable, showing that there is not an overreliance on the older, more experienced cohort, nor is there an overabundance of younger, less-experienced researchers. Another strength is that while there are relatively few female researchers, they are not confined to those categories traditionally thought to be female-oriented; thus, it can be assumed that they are working in their chosen, and presumably most efficient, areas of interest and expertise.

A weakness may be indicated in the levels of expertise achieved as evidenced by the relative lack of education in this NARS. A caution should be noted here, however. If the organization has defined as its mission that research be restricted to adaptive research, then it may well be that master's-level scientists have the technical expertise necessary to accomplish the task. More education in the form of PhD training may be superfluous.

Disciplinary Capability

Scientists were requested to indicate educational discipline and current discipline from a prepared list of 12 disciplinary categories (Figure 4, Table 3*). Sixty percent of staff studied crop sciences (including plant production, plant breeding, and plant protection) for their highest degree. Sixty-one percent of staff currently work in crop sciences.

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* This list of categories is designed to describe the general clusters of crop, livestock and support disciplines. Several ways to collect this information had been attempted in the pretests, such as more extensive disciplinary lists and open-ended questions. It was determined that the clusters provided more reliable and quantifiable information.

Figure 2:

Percent Distribution of Work Experience

Ecuador - 1988

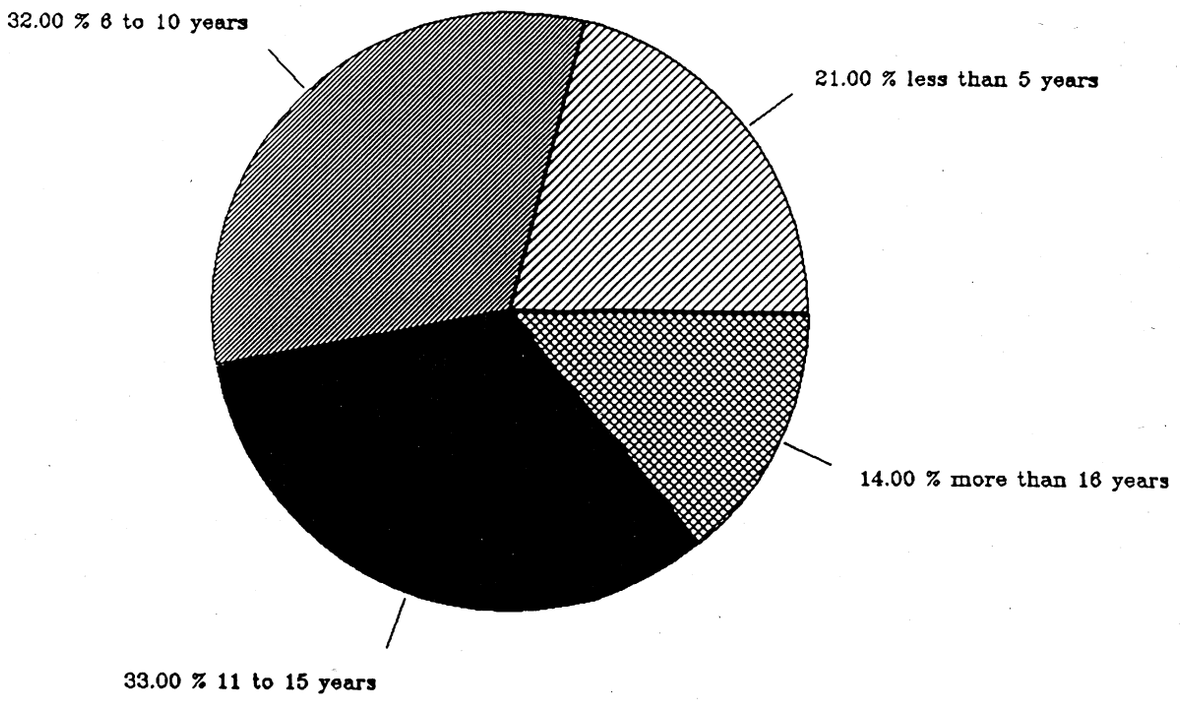
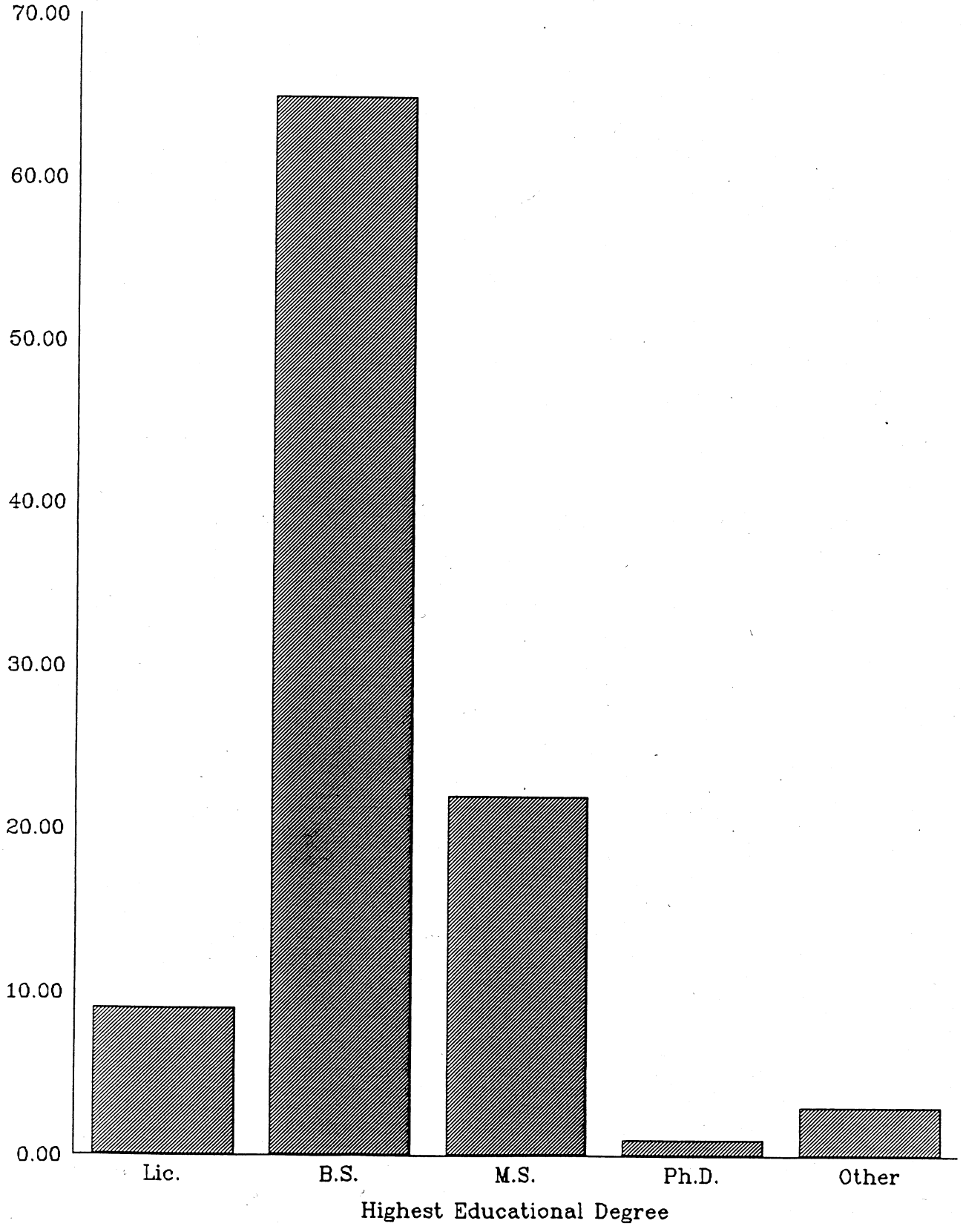


Figure 3:

Percent Distribution of Educational Degrees

Ecuador - 1988



Nine percent studied animal science, including animal health and animal nutrition, while eight percent are currently working in animal science. Thirty percent studied in a support science field, including basic science, soil science, natural resource management, socioeconomics, agricultural engineering, food and nutrition, and management. Thirty-one percent of staff are currently working in these fields. Figure 4 illustrates the percent distributions of the specific educational disciplines.

The distribution of staff among crop, animal and support sciences has remained roughly the same between education and current practice. Within the general categories, however, there has been considerable change. For example, in the crop science cluster, the percent of staff in plant breeding has increased from 17% to 27%, at the expense of plant production, which has dropped from 22% to 12% of the staff. In the support sciences, the percent of staff in basic science and soil science has decreased from 19% to 7%, while nutrition has gained staff, from 4% to 11%. The percent of staff in management has increased from 2% to 6%.

Table 3:

Distribution by Discipline
Ecuador - 1988

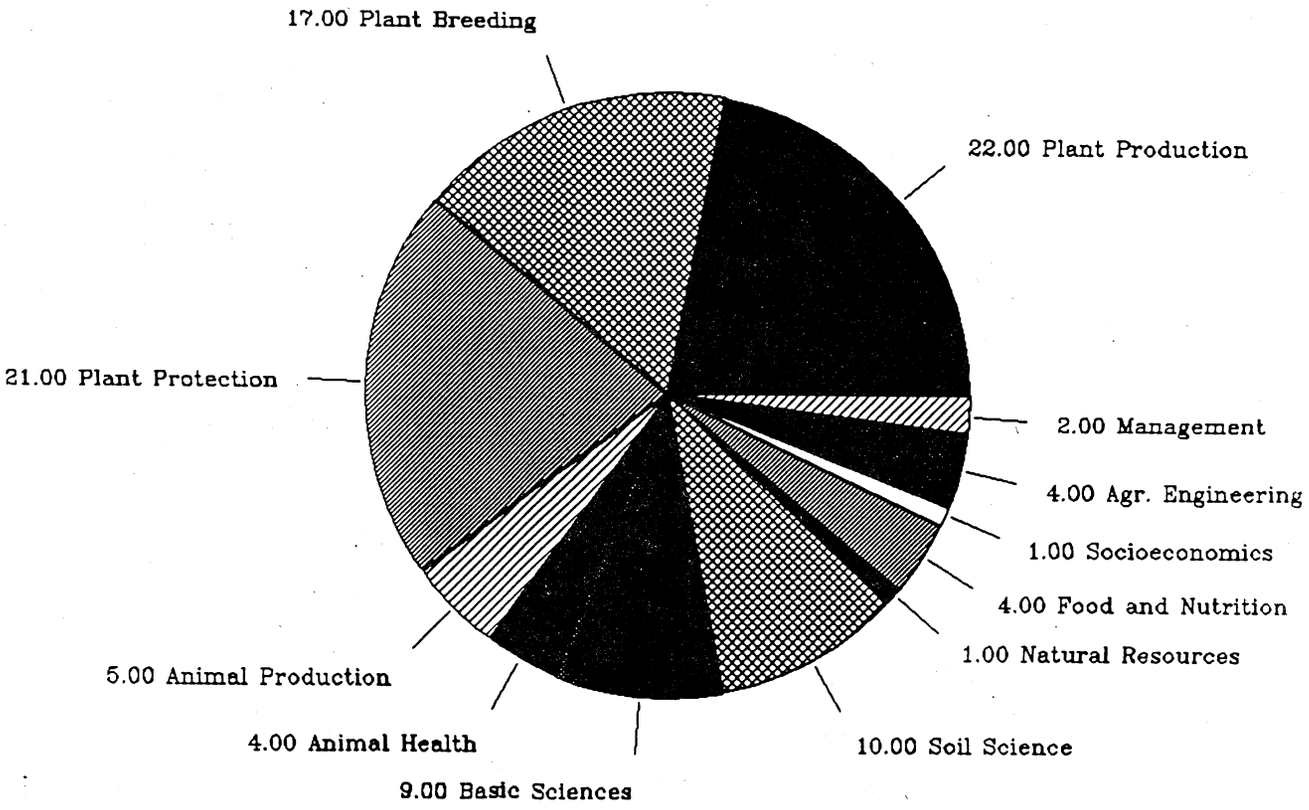
DISCIPLINE	EDUCATION		CURRENT		DIFFERENCE
	Number	% of Total	Number	% of Total	in %
Plant Production	25	22	15	12	- 10
Plant Breeding	19	17	32	27	+ 10
Plant Protection	24	21	26	22	+ 1
Animal Production	6	5	7	6	+ 1
Animal Health	4	4	2	2	- 2
Basic & Support Science	10	9	3	2	- 7
Soil Science	11	10	7	5	- 5
Natural Resource Management	1	1	1	1	0
Socioeconomics	1	1	5	4	+ 3
Agricultural Engineering	5	4	2	2	- 2
Food and Nutrition	5	4	13	11	+ 7
Management	2	2	7	6	+ 4

Figure 4 goes here.

Figure 4:

Percent Distribution of Educational Disciplines

Ecuador - 1988



In the animal science cluster there is virtually no capability, since the number of scientists does not indicate a critical mass. In addition to the lack of critical mass in the animal sciences disciplines, the information is further refined by identifying scientists by research station/institute assignment. Only one station, Santa Catalina, has a combination of both animal production and health. All of the other stations/institutes have scientists in only one of the animal science components, despite the fact that INIAP is charged with the responsibility of livestock research including management practices and species improvement (Tables 3 and 4).

Three issues/questions arise from this comparison. First, is the shift in the crop science cluster intentional or has it occurred due to changing organizational needs?

The movement of scientists among crop science disciplines has serious implications for planning, training and scientist motivation. With respect to planning, a strategic plan for human resources should target positions by discipline, based on need, and fill them accordingly. With respect to training, the training required of the individual who switches into one discipline from another may be different from that of the individual trained in that discipline in the university. With so many people switching categories, an analysis of training needs and opportunities is necessary. Additionally, motivational and leadership style changes may be required of management. For example, switching positions may on the one hand enhance upward mobility and enthusiasm of the scientist. On the other hand, if the individual's skills are not adequate, the new job may lead to a decrease in the individual's confidence. Such a change in confidence may require a different leadership style, temporarily, until the individual can continue as a professional on his/her own. (See Abe, 1989 for a more thorough explanation of the adjustment cycle).

Second, is the relative weakness of staff in animal sciences consistent with organizational goals and objectives? Is this lack of scientific capacity absorbed by private industry?

It appears fairly clear that the small number of researchers in animal science disallows the possibility of accomplishing the organizational objectives of both management practice and species improvement. The average years of experience for animal scientists is 7.6, approximately 25% lower than the average of scientists in the entire organization. It is possible that this discrepancy indicates a higher turnover rate for animal scientists than for others. It has been suggested that animal scientists are leaving INIAP to work for private industry.

Third, with respect to support sciences, while only two people have been professionally trained in the management sciences, support activities constitute a relatively large percentage of staff time, particularly in the central office. The training plan should reflect the need for management skills training for all managers.

Scientific Orientation

The scientists were requested to identify the percentage of their time that was spent in various work activities, such as research, administration, teaching, extension, travel/conferences, and other. As is shown in Figure 5, the majority of the work activity was spent in research: 60%. Administration, combined with "other", constituted 23%, and teaching, extension, farming, and travel/conferences constituted 5%, 4%, 4%, and 4% respectively.

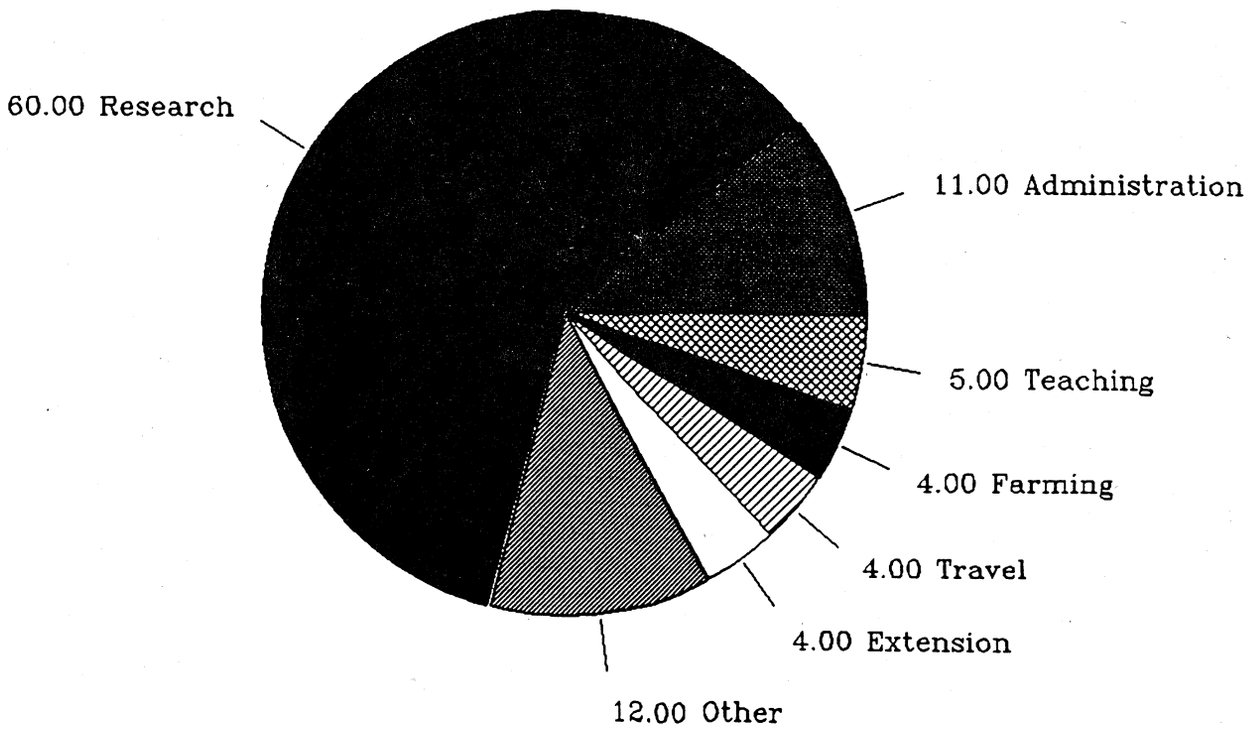
Table 4: ECUADOR HUMAN RESOURCES SURVEY
Current Disciplines
by Institute

Institute	Number of Researcher Responses	Plant Production	Plant Breeding	Plant Protection	Animal Production	Animal Health	Basic Science	Soil Science	Natural Resource Management	Socio-Economics	Agric. Eng.	Food & Nutrition	Management
Boliche	22	3	6	8	0	0	0	3	0	1	0	0	1
Central	8	1	0	1	0	0	0	0	0	2	0	0	4
Chuquipata	6	1	2	2	0	0	1	0	0	0	0	0	0
Mapsiche	0	0	0	0	0	0	0	0	0	0	0	0	0
Payamino	3	0	0	1	1	0	0	1	0	0	0	0	0
Pichilingue	16	4	7	1	0	0	1	0	0	1	1	1	0
Pillaro	1	0	1	0	0	0	0	0	0	0	0	0	0
Portoviejo	21	1	7	5	2	0	1	2	0	1	1	1	0
Sta Catalina	31	3	9	5	1	2	0	0	0	0	0	11	0
Sto Domingo	12	2	0	3	3	0	0	1	1	0	0	0	2
TOTAL	120	15	32	26	7	2	3	7	1	5	2	13	7

Figure 5:

Percent Distribution of Work Activities

Ecuador - 1988



When requested to characterize their research for the last five years, the scientists identified 25% in basic research (defined as new scientific knowledge), 48% in applied research (defined as practical use for existing knowledge), and 27% in adaptive research (defined as tailor-- applied research to specific locations).

It is not surprising that when research activities were controlled by years of experience that the older, more experienced group spent less time on research (50%) and more time on administration (25%).

However, it is interesting to note that the scientists with the least experience spent more of their research time on basic research than the older, more experienced researchers (see Tables 5 and 6).

Concerning professional advancement, the scientists were requested to select from a list the three most important criteria that actually did and ideally should influence their professional advancement. Results from these questions are presented in Table 7. Experience was ranked the most important criterion both actually and ideally, with effort devoted to research and academic/technical qualifications also considered to be important both actually and ideally. Surprisingly, peer or supervisor evaluations were important actually, but the scientists felt that ideally these should not be accorded such importance. Conversely, professionalism (defined by motivation and/or initiative) was ranked 6th actually but ideally was almost as important as effort devoted to research. Organizational policies and attendance at seminars/conferences were not of relative importance in either actual or ideal rankings.

Next the scientists were requested to identify what they considered to be the three most serious limitations to their career advancement (Table 8). The most important limitation was considered to be peer or supervisor evaluation.

This is consistent with the above information where they ranked evaluations as being ideally less important than they actually are. Experience was considered to be the second most serious limitation to career advancement. This may well be a reflection of the age distribution within the organization. Verification of this phenomenon could be accomplished by controlling the limitation variables by the age cohort variable.

Impact/use of research results and seminars/conferences attended were viewed approximately the same concerning limitations to advancement. This is interesting because neither was considered relatively important, actually or ideally, as a criterion for advancement. Academic qualifications were also considered as a relatively serious limitation; however, as is the case with experience, this may be a manifestation of the younger age cohort. The least serious limitation was professionalism. Because they consider themselves professional and they consider professionalism important, it is possible that they do not consider it to be a serious limitation to their career advancement.

Table 5: PERCENT DISTRIBUTION OF WORK ACTIVITIES
Ecuador - 1988

DATA GROUP	Number in Group	Number with Total Activity Percent = 100	Average Percent of Work Time Spent on: Research	Administration	Teaching	Extension	Travel	Production	Other	Total %
All Respondents	148	140	60	11	5	4	4	4	12	100
Highest Degree -- BS or below	109	102	61	8	5	4	5	5	12	100
Highest Degree -- MS or below	34	33	61	17	6	5	4	2	6	101*
Less than 5 years Experience	31	27	63	2	1	4	5	11	14	100
6-10 years Experience	47	46	61	15	4	3	5	4	8	100
11-15 years Experience	49	47	62	6	8	4	4	1	14	99*
More than 15 years Experience	21	20	50	25	6	3	3	2	11	100

* Total % may not add to 100% due to rounding.

Table 6: ACTUAL PERCENT DISTRIBUTION OF RESEARCH TYPES
Ecuador - 1988

DATA GROUP	Number in Group	Number with Total Percent = 100	Actual Average Percent of Research Time on: Basic	Applied	Adaptive	Total %
All Respondents	148	101	25	48	28	101*
Highest Degree -- BS or below	109	74	25	48	27	100
Highest Degree -- MS or below	34	25	24	48	27	99*
Less than 5 years Experience	31	16	35	37	28	100
6-10 years Experience	47	35	23	47	30	100
11-15 years Experience	49	37	23	51	26	100
More than 15 years Experience	21	13	22	52	26	100

* Total % may not add to 100% due to rounding.

Table 7:

Criteria for Professional Advancement

CRITERIA	Actual (n = 141) 1st Most Important	2nd Most Important	3rd Most Important	Total Points	Rank	Ideal (n = 123) 1st Most Important	2nd Most Important	3rd Most Important	Total Points	Rank
Experience	195	93	16	304	1	175	96	17	288	1
Academic/Technical Qualifications	185	45	10	240	2	95	33	12	140	4
Effort Devoted to Research	110	78	10	198	3	95	93	14	202	2
Peer or Supervisor Evaluation	125	39	10	174	4	25	3	4	32	7
Research Result Reported	70	69	16	155	5	55	36	16	107	6
Professionalism (i.e., motivation)	65	33	18	116	6	95	54	24	173	3
Impact/Use of Research Results	25	30	25	80	7	55	39	24	118	5
Organizational Policies or Attitude	25	36	7	68	8	15	9	3	27	8
Other	35	9	6	50	9	0	0	1	1	10
Seminars/Conferences Attended or Organized	20	9	15	44	10	10	9	7	26	9

Agricultural Researchers were requested to select the three most important criteria (actual and ideal) for professional advancement within their institutions. Total points were computed by multiplying the number of respondents who selected the various criteria by a factor of 5 for the 1st most important, 3 for the 2nd most important, and 1 for the 3rd most important.

Table 8:

Limitations to Career Advancement

Criteria	1st Most Serious	2nd Most Serious	3rd Most Serious	Total Points
Peer or Supervisor Evaluation	130	42	15	187
Experience	115	33	5	153
Impact/Use of Research Results	65	30	16	111
Seminars/Conferences Attended or Organized	40	48	21	109
Academic Qualifications	60	30	10	100
Research Results Reported	25	57	9	91
Effort Devoted to Research	35	36	5	76
Professionalism	35	15	11	61

Agricultural researchers were requested to select the three most serious limitations to their career advancement. Total points were computed by multiplying the number of respondents who selected the various criteria by a factor of 5 for the 1st most serious, 3 for the 2nd most serious, and 1 for the 3rd most serious.

Performance Management: Assessing Needs

The key elements of managing the performance of individuals in an organization are compensation, appraisal, and organizational behavior. The understanding of compensation, both monetary and non-monetary, requires recognition of strengths and constraints of the organizational plan for compensation and the capability to create change (if necessary). The understanding of appraisal requires information flow on job requirements, accomplishment of tasks, and relevance to organizational plans and objectives.

The final element, organizational behavior, requires an understanding of a number of subfields such as leadership, motivation, conflict management, and communications. It is essential that these elements be coordinated and integrated so that scientist performance is kept high. Coordination and integration of the cluster of subfields in organizational behavior can be facilitated by an understanding of what motivates the individual scientists.

Understanding scientist motivation helps the manager select an appropriate leadership style, resolve conflicts, and communicate among scientists and between organizational levels. It is therefore essential to know how scientists view their work environment, to understand their attitudes about the importance and adequacy of organizational resources.

In order to study researcher perceptions of their work environment, a series of factors describing the work environment was adapted and expanded from Hargrove (1978) and Lacy et al. (1983). The factors were used to elicit the scientist's opinion about the adequacy and importance of such resources in INIAP. The scientists were asked to indicate both the adequacy of these factors in their current research and the importance of these factors for the success of their research. A 5-point scale was constructed, where 1 = very adequate and very important and 5 = very inadequate and very unimportant. The 26 items were divided into four general categories: personal, administrative, professional, and organizational.

The categorization of these factors is an adaptation of the resources known to be necessary for successful research. They have been put in an order approximating the factors in classical organizational behavior literature, such as Maslow's (1943) hierarchy of needs and Herzberg's (1966) hygiene-motivation factors. According to Maslow (1943), people are motivated by their own needs, which occur in a hierarchial order that proceeds from physiological, to safety, to social, to ego, and finally to self-actualization. Once a need is satisfied at one level, then it ceases to be a motivator. Conversely, if satisfaction of a need is blocked, its importance becomes preeminent, to the detriment of successive levels.

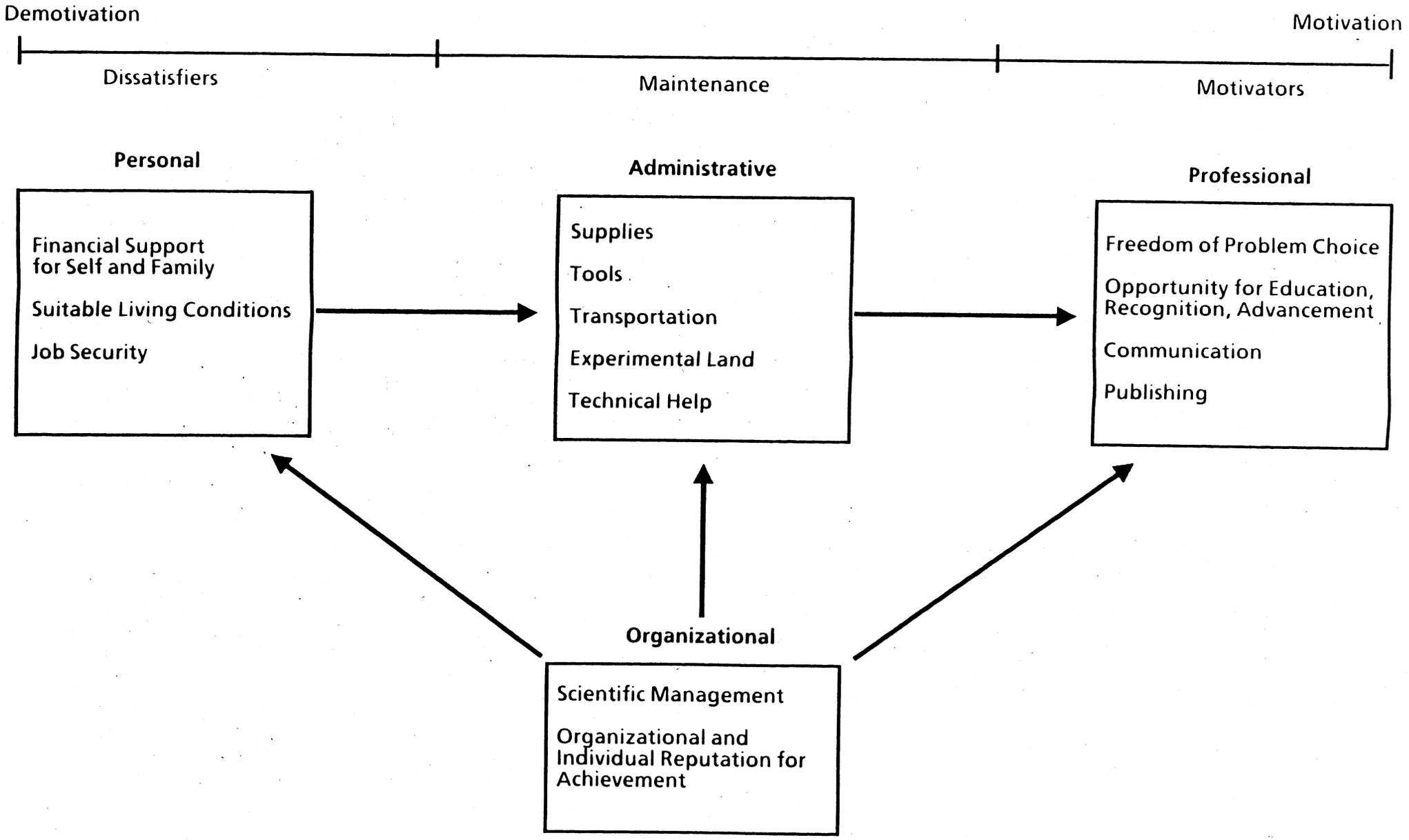
Herzberg (1966) refined this approach by identifying factors that were determinants of dissatisfaction, which he referred to as hygiene or maintenance factors, and factors that were determinants of satisfaction, which were called motivators.

For the categories of resources for agricultural research, the cluster of personal factors are roughly equivalent to Maslow's (1943) physiological and safety needs. These would be considered dissatisfiers or demotivators if they were inadequate. The cluster of administrative factors is basically those physical resources necessary to successfully accomplish scientific experimentation, and as such, their absence would be a demotivator. The cluster of professional factors is those which positively motivate research. They are a combination of Maslow's (1943) ego needs and Herzberg's (1966) motivating factors. The final cluster of organizational factors is those which influence positive performance by creating expectations. While they are considered motivators and are an approximation of Maslow's (1943) self-actualization level, they also affect the other clusters. An illustration representing this approach is attached as Figure 6.

It was recognized that questions on values and attitudes are culturally specific and relevant and that hence there was a risk that using western-oriented organizational behavior theories to study researcher perceptions would superimpose western-oriented values. The discussion of this difficulty has been succinctly stated by Saha: "In non-Western countries, which are mostly borrowers of products and processes originating in the West, persisting non-rational modes of thought and behavior impede effective technological transfer and diffusion.... Such technology is a subsystem of a larger cultural system, its effective management involves consideration of the ideological and normative parameters" (Saha 1988:592).

Figure 6:

Agricultural Research Factors / Behaviour Models



However, other work in the field (Child: 1981) indicates that there are two streams of opinion on the issue. Child contends that because managerial and organizational issues are becoming increasingly similar throughout the world, managerial and organizational cultures are becoming universal (Child in Swierczek: 1988). The case in point to support Child's contention is Swierczek's work in Thailand, where he indicates that Thai and American managers "...provide similar diagnosis of and solutions to managerial and organizational problems" (Swierczek 1988:74). Swierczek's application of Herzberg's Motivation-Hygiene Theory produced results from Thai managers that matched what was expected according to the theory. In addition, results of 67 Thai managers reviewing and providing solutions for a case indicated that the needs which were suggested by the group could fit into Maslow's hierarchy of needs. This universal perspective position is supported by Negandi (1983) and Peters and Waterman (1982).

In addition, the culture and values of the agricultural research system in Ecuador are inherently western. They are positivist, scientifically oriented, and rational. The implication here then is that the needs of individual scientists are similar to those expressed in the social psychology literature which began with Maslow.

Results

With respect to the individual factors necessary to conduct research, all but one were within the range of 1.21 to 1.99. Thus, all were considered to be important to very important. Financial support for self and family, management's reputation for scientific achievement, and quality of trained technical help were the three most important factors. The least important factor was the opportunity to gain scientific recognition.

With respect to the adequacy of the resources, the majority of the factors were less than adequate. While some of the factors were more adequate than others, such as: the organization's reputation for scientific achievement; availability of experimental land, and personal freedom to determine research problems; the adequacy score of each was considerably less than their importance scores. The least adequate resource was financial support for self and family.

With respect to the differences between adequacy and importance, <u>all</u> of the factors were considered less adequate than they were important. The smallest differences were in the management's and organization's reputation for scientific achievement and in personal freedom to deter- mine research problems. The largest difference was in financial support for self and family, which was considered to be the <u>most</u> important but <u>least</u> adequate resource. Details of this information are presented in Table 9.

A summary of the data for the clusters of factors indicates that the personal factors were considered the most important and the least adequate. As was the case with individual factors, all clusters were considered less adequate than important, with the differences largest in the personal factors, becoming progressively less through administrative, professional, and organizational factors.

Several conclusions can be obtained from this array of data. First, the scientist's perception is that there is inadequate financial support for self and family. That this factor, at the most basic level, is the least adequate and also the most important, confirms the classical theory that, if not satisfied, the physiological or hygiene factors will become preeminent.

Table 9:

Resource Adequacy and Importance

	Adequacy (1)	Importance (2)	Difference (1) - (2)
1) PERSONAL			
Financial Support for Self and Family	3.59	1.21	2.38
Suitable Living Conditions	3.11	1.34	1.77
Job Security	2.50	1.46	1.04
Personal Average	3.07	1.34	1.73
2) ADMINISTRATIVE			
Operating Supplies and Materials	3.09	1.36	1.73
Transportation	3.21	1.49	1.72
Availability of Experimental Land	2.39	1.64	0.75
Equipment and Tools to Use in Research	3.06	1.35	1.71
Office and Laboratory Facilities	3.04	1.68	1.36
Availability of Labor	3.30	1.67	1.63
Quality of Labor	3.27	1.75	1.52
Scientific Literature/Library	3.28	1.35	1.93
Availability of Trained Technical Help	2.82	1.33	1.49
Quality of Training for Technical Help	2.59	1.29	1.30
Availability of Advice from Experienced Researchers	3.28	1.76	1.52
Administrative Average	3.03	1.52	1.51
3) PROFESSIONAL			
Personal Freedom to Determine Research Problems	2.44	1.55	.89
Contact with Other Scientists	3.01	1.43	1.58
Opportunities for Advanced Education	3.20	1.51	1.69
Opportunities to Gain Scientific Recognition	3.38	2.01	1.37
Opportunities for Professional Advancement	3.26	1.60	1.66
Opportunities for Promotion Based on Merit	3.27	1.44	1.83
Opportunities for Training People Who Work under Your Direction	2.94	1.54	1.40
Opportunities for Practical Implementation of Output	2.85	1.46	1.39
Opportunities to Publish Research Findings	2.77	1.41	1.36
Professional Average	3.01	1.55	1.46
4) ORGANIZATIONAL			
Scientific Training of Management	2.52	1.41	1.11
Management's Reputation for Scientific Achievement	2.54	1.73	0.81
Organization's Reputation for Scientific Advancement	2.12	1.27	0.85
Organizational Average	2.39	1.47	0.92

Agricultural researchers were requested to identify the adequacy and importance of a number of resources on a 5-point scale, where 1 = very adequate, very important and 5 = very inadequate, very unimportant.

Total 'n' = 148; however, individual variables may be less due to missing data. Scores were calculated by a standard statistical formula for means.

However, despite this confirmation, the scientific process has continued. Thus, despite the preeminence of a demotivating factor, activities have proceeded at subsequent levels. The implication of this progression is either acceptance of the less-than-adequate situation or a realization that organizational control over this factor is limited.

Regardless of the disposition of the financial remuneration conditions, recognition of scientist perceptions will enable managers to identify certain other factors (i.e., professional) that are fully within their control, relatively cost-free, and considered important by the scientists.

This recognition should be seized as an opportunity to create a social and organizational milieu that supports the professional factors and thus motivates individual scientists.

Table 10 displays the summary information and indicates strategies and solutions that may be considered, based on the scientists' responses. In the personal category, the most important and least adequate factor was financial support for self and family.

This is, of course, a classic characteristic of third world agricultural research organizations. First of all, it must be recognized that the organization itself has limited control in this area because salary schedules are set by civil service regulations. However, implications for turnover, switching of categories, and loss of the more competent and competitive scientists, such as those trained in animal science, provide support for claiming a larger share of the federal budget.

If, in fact, the organization is to obtain its national goals, then the less-than-adequate salary structure must be recognized as a major constraint. The national government must accept that the-less-than adequate situation will interfere with the attainment of its goals or it must improve the salary structure.

Administrative factors were considered to be important but only average in adequacy. It should be determined whether or not this is a budgetary constraint or if this difference is an efficiency problem.

If it is a budgetary problem, then, as with the personal cluster, it should be pointed out that the accomplishment of science requires certain tools, supplies, and facilities. If it is an efficiency problem, i.e., supplying labor at the proper time or having supplies available when needed, then a corrective action plan to improve efficiency should be devised.

The factors in the professional cluster are also important and less than adequate, according to the scientists. It should be recognized that there is very little organizational cost associated with the provision of opportunities, such as problem choice, recognition, and promotion based on merit. However, the status, prestige, and morale provided by these are invaluable to the individual and the organization. In addition, entrepreneurial funding of exceptional researchers can enhance the scientific advancement and recognition of the organization as well as the individual.

The scientists consider the cluster of organizational factors to be important and of higher-than-average adequacy. Thus there is an internal respect for management, particularly in terms of the organization's reputation for scientific advancement. Enlightened management will help to maintain this positive image among its researchers.

Table 10: Hierarchy of Needs, Importance/Adequacy Summary

Traditional Need Categories	Needs for Agricultural Researchers	* Importance	* Adequacy	Strategies/Solutions
Physiological (minimum salary, wages, working conditions)	Personal (financial support, living conditions, job security)	1.34	3.07	Improve salary and living conditions
Safety (job security, higher quality of work life)	Administrative (supplies, materials, transportation, land, labor, literature, facilities)	1.52	3.03	Organize and supply administrative support more efficiently
Social (friendly co-workers, thoughful supervisor) Esteem (promotion, recognition, praise, feedback)	Professional (freedom, contact, recognition, advancement, merit, output)	1.55	3.01	Assure that organization provides opportunities, recognition, and rewards on output, merit
Self-actualization (challenging, useful abilities, participation)	Organizational (reputation, prestige)	1.47	2.39	Maintain organizational and management reputation

Note*

Agricultural Researchers were requested to identify the adequacy and importance of a number of resources on a 5-point scale where 1 = Very Adequate, Very Important and 5 = Very Inadequate, Very Unimportant.

Total 'n' = 148; however, individual variables may be less due to missing data. Scores were calculated by a standard statistical formula for means.

In an effort to further understanding of the scientists' assessment of adequacy and importance of factors necessary for the accomplishment of science, the factors were controlled by education (BS and below, MS and above) and by experience (less than 5 years, 6-10, 11-15, and more than 15 years). The following two tables (Table 11 and Table 12) show that there was very little difference in the scientists' perceptions, based on these controls. One interesting point was that those scientists with more than 15 years of experience in research considered the organization's reputation for scientific advancement to be the most important factor of all (1.05).

Importance of Research Objectives

The agricultural researchers were asked to indicate the importance of objectives to their research on a scale where 1 = of no importance and 5 = of highest importance. All of the objectives listed were rated above 3.0 on the scale, with scores ranging 4.79 to 3.14. The most important research objective according to the scientists was increased agricultural productivity, with the development of new knowledge or improved methodo- logy the second most important. These results are generally consistent with previous studies of developed and developing countries (Marcotte et al. 1982; Busch and Lacy 1983; Lacy et al. 1983) with the following exceptions. All factors were considered more important than indicated by U.S. scientists, and decreasing production costs was relatively more important than in previous studies. Details are illustrated in Table 13.

Research Beneficiaries

The agricultural scientists were requested to indicate how their research does and should benefit potential beneficiaries, using a scale of 1 to 5, where 1 = not at all and 5 = a great deal. The range for will or does benefit was from 3.71 to 2.83, with small farmers, scientists in their own discipline, and extension being considered the primary beneficiaries. Only other scientific disciplines and the general public received a score of less than 3.

When responding to the same list of potential beneficiaries in terms of who "should" benefit, the results changed considerably. First, the scores for all potential beneficiaries were higher, with the exception of small farmers. Thus, there is apparently some question on the part of the scientists that results may not be reaching those who should benefit from the research. Second, while it was suggested that small farmers as a group should benefit, there were eight other potential beneficiaries who the scientists thought should take precedence over the small farmer. The results of this scale are illustrated in Table 14.

Limitations to Research

The scientists were requested to select the three most serious limitations to research. The choices were weighted to arrive at an overall score, where the most serious limitation was given 5 points, the second most serious, 3 points, and the third most serious, 1 point.

Table 11: Hierarchy of Needs: Importance/Adequacy Controlled by Education

	n = 109 BS or below		n = 34 MS+	
	Adequate	Important	Adequate	Important
Personal Factors	3.13	1.36	2.89	1.29
Administrative	3.05	1.52	2.99	1.52
Professional	3.07	1.55	2.85	1.55
Organizational	2.34	1.47	2.55	1.45

Note: Agricultural researchers were requested to identify the adequacy and importance of a number of resources on a 5-point scale, where 1 = very adequate, very important, and 5 = very inadequate, very unimportant.

(n) for some individual factors may be slightly less because not all scientists responded to all variables.

Table 12: Hierarchy of Needs: Average Importance/Adequacy Controlled by Years of Experience in Agriculture as a Scientist

	Adequate				Important			
	n= (31) <5	n= (47) 6-10	n= (49) 11-15	n= (21) <15	n= (31) <5	n= (47) 6-10	n= (49) 11-15	n= (21) <15
Personal	2.97	3.12	2.95	3.33	1.59	1.24	1.26	1.33
Administrative	3.07	3.05	2.90	3.25	1.70	1.46	1.49	1.43
Professional	2.98	2.90	3.15	3.00	1.65	1.48	1.55	1.55
Organizational	2.28	2.52	2.27	2.58	1.61	1.51	1.41	1.29

Note: Agricultural researchers were requested to identify the adequacy and importance of a number of resources on a 5-point scale, where 1 = very adequate, very important, and 5 = very inadequate, very unimportant.

(n) for some individual factors may be slightly less because not all scientists responded to all variables.

Table 13:

Importance of Research Objectives

Objectives	Importance Score
Increase Agricultural Productivity	4.79
Develop New Knowledge or Improved Methodology	4.51
Decrease Production Cost of Farm Products	4.34
Improve Level of Rural Living	4.28
Improve Protection from Insects, Disease, Other Hazards	4.17
Provide Input to Other Researchers	4.16
Protect Consumer Health and Improve Nutrition	4.09
Expand Demand by Developing New Products or Enhancing Product Quality	3.96
Improve Support Services	3.92
Promote Community Improvement	3.52
Improve Marketing Efficiency	3.45
Reduce Import Expenditures	3.28
Expand Export Receipts	3.14

Agricultural researchers were requested to indicate the importance of objectives of agricultural research on a 5-point scale, where 1 = of no importance and 5 = of highest importance.

'n' varied from 143 to 128. Scores were calculated by a standard statistical formula for means.

The most serious limitation to research was clearly financial resources, which received a total of 453 points. Second and third were human and physical resources respectively. In relative terms, academic qualifications and professionalism were of no consequence. Details of this scale are illustrated in Table 15.

Difficulty of Management Activities

The final section of the questionnaire requested agricultural researchers to select three management activities that they found the most difficult to perform to their satisfaction. The first most difficult received 5 points, the second 3 points, and the third 1 point. The results of their individual difficulties indicated that again the availability of resources and the efficient use of resources were the most difficult for them to manage. Communications and control activities were the least most difficult to manage. Details of the results are attached in Table 16.

Table 14:

Research Beneficiaries

	Will or Does Benefit (1)	Should Benefit (2)	Difference (2)-(1)
Small Farmers	3.71	3.71	0.0
Extension	3.69	4.66	.97
Scientists in Own Discipline	3.69	4.75	1.06
Agribusiness	3.56	4.17	.61
Local/State Government	3.54	4.41	.87
Farming Systems Research Groups	3.49	4.44	.95
Rural Residents	3.43	4.46	1.03
Foreign Groups, Institutions, or Governments	3.22	3.69	.47
Other	3.17	3.81	.64
Other Scientific Disciplines	2.92	3.65	.73
General Public	2.83	3.73	.90

Agricultural researchers were requested to indicate how their research does or should benefit a series of potential beneficiaries. A scale of 1 to 5 was provided, with 1 = not at all and 5 = a great deal.

'n' = 148; however, it may be less for the individual variable due to missing information. Benefit scores were calculated by a standard statistical formula for means.

Table 15:

Limitations to Research

Criteria	1st Most Serious Limitation	2nd Most Serious Limitation	3rd Most Serious Limitation	Total Points
Financial Resources	370	75	8	453
Human Resources	75	102	29	206
Physical Resources	25	117	28	170
Experience	50	15	8	73
Organizational Norms and Attitudes	15	27	25	67
Other	25	3	7	35
Academic/Technical Qualifications	25	0	7	32
Professionalism (Motivation, Initiative)	5	15	6	26

Agricultural researchers were requested to select the three most serious limitations to their research. Total points were computed by multiplying the number of respondents who selected the various criteria by a factor of 5 for the 1st most serious, 3 for the 2nd most serious, and 1 for the 3rd most serious.

Table 16:

Difficulty of Management Activities

Management Activities	1st Most Difficult	2nd Most Difficult	3rd Most Difficult	Total Points
Obtaining Additional Resources	130	66	23	219
Improving Use of Operating Resources	90	51	16	157
Implementing Policy and Planning Priorities	85	30	20	135
Evaluating Past Activities	75	36	9	120
Improving Morale of Nonprofessional Staff	45	39	8	92
Maintaining Physical Facilities	45	30	8	83
Monitoring Ongoing Activities	25	15	5	45
Communicating with Farmers and Other Clients	15	21	3	39
Talking to Staff about Their Problems	10	12	3	25
Other	10	9	5	24
Maintaining Effective Control and Discipline of Staff	0	9	6	15

Agricultural researchers were requested to select the three most difficult management activities to perform. Total points were computed by multiplying the number of respondents who selected the various criteria by a factor of 5 for the 1st most difficult, 3 for the 2nd most difficult, and 1 for the 3rd most difficult.

Summary of Findings

A number of specific findings can be drawn from the mission review report and the data as they are displayed and analyzed. The following list highlights some of these:

* None of Ecuador's development plans through 1984 identified specific human resource needs in the agricultural sector.

* There is a broad range of years of work experience in the organization, which is relatively evenly distributed in 5-year cohorts.

* Educational levels of professional staff are substantially below World Bank targets and other NARS.

* There is a lack of research capability in the animal science component, bringing into question the possibility of achieving the organizational objectives.

* Only one research station has a combination of animal production and health.

* There is a substantial shifting from disciplines in which scientists were trained, which has implications for both planning and training.

* A relatively high percentage of research time is devoted to basic research (25%) for an organization that does not have the educational skills or the mandate to create new scientific knowledge.

* The older, more-experienced scientists spend more time on administration and the younger, less-experienced scientists spend more time on basic research.

* There are limited possibilities for advancement, and the salary increases are small.

* While scientists felt that peer or supervisor evaluation should not be considered important in determining their career advancement, they considered peer or supervisor evaluations in fact to be the most serious limitation to career advancement.

* Despite less-than-adequate monetary compensation, there remains a stable experienced cadre of research scientists.

* Despite the inadequacies of personal factors necessary to accomplish research, administrative, professional, and organizational factors are almost of equal importance, thus diverging from social psychological theory on hierarchy and motivation.

* Although salaries are set by civil service and are therefore not subject to change by the organization, other factors are considered by the scientist to be equally important that can be influenced by management to provide motivation.

* The organization's reputation for scientific advancement was considered by the scientists to be almost as important as their salaries.

* There was very little difference between age groups or levels of academic achievement in the scientists' perceptions of the adequacy and importance of factors needed for research.

The one exception was that the organization's reputation for scientific advancement was the most important factor for those scientists with more than 15 years experience.

* Research objectives of individual scientists were consistent with organizational objectives.

* While small farmers were considered to be the primary beneficiaries of the research, the scientists expressed their opinions that others such as scientists in their own discipline should be beneficiaries.

* Not surprisingly, the most serious limitation to research was a lack of financial resources, and the most difficult management activity to perform was obtaining additional resources.

Recommendations

While the questionnaire and subsequent analysis discussed above could be stand-alone products, the intention was to incorporate relevant information into the 1st stage, the diagnosis, of the 3-stage process. The combination of this information with other information collected during the review and the expertise and experience of the advisory service personnel, led the review team to the following recommendations.

The basic tasks INIAP needs to undertake immediately are:

1. A detailed and integrated analysis of all available personnel involved in executing research activities, not only at the INIAP level, but also other institutions public and private, such as universities, foundations, and other subordinate sectors.

2. To match the objectives of the National Plan for Agricultural Research and its programs with the available personnel. To identify needs based on projections for the next 5-10 years.

3. To develop a plan for short-, medium-, and long-term capacity in accordance with the diagnosis and projections of the research programs of the plan.

4. To develop a salary schedule for researchers that includes job descriptions, promotions, classification systems, levels of remuneration, and benefits based on productivity and results, not only for scientists, but for technology which is applicable at the producer level as well. (ISNAR Draft report on INIAP 1988:43).

ISNAR is presently negotiating a workplan for INIAP to address these problems.

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HUMAN RESOURCE SURVEY - ECUADOR - 1988

One of the most important functions of a national scientific research system is the development, retention, and continued motivation of a body of scientific professionals. It is human resources, in the form of scientists, that provide the knowledge and expertise for development. It is, therefore, of critical importance that the scientists themselves be understood in order to understand the research enterprise. This understanding will assist management in making better decisions on staff recruitment, selection, training, performance, motivation, and utilization.

Your cooperation in completing this questionnaire will greatly assist in this understanding. Thank you for your time and information.

A. Background Information: This set of questions provides information about your background and education.

Please give year of birth: 19____

Please check:

Sex: Male _____ Female _____

Highest degree obtained:

PhD _____
MSc _____
BSc _____
Other _____

What was your academic discipline in your highest degree obtained? What discipline are you currently working in? Please check ___ one in each of the following columns.

Educational Discipline	Current Discipline
____ Plant Production	____ Plant Production
____ Plant Breeding	____ Plant Breeding
____ Plant Protection	____ Plant Protection
____ Animal Production	____ Animal Production
____ Animal Health	____ Animal Health
____ Basic & Support Sciences	____ Basic & Support Sciences
____ Soil Science	____ Soil Science
____ Natural Resource Management	____ Natural Resource Management
____ Socioeconomics (including Extension)	____ Socioeconomics (including Extension)
____ Agricultural Engineering	____ Agricultural Engineering
____ Food & Nutrition	____ Food & Nutrition
____ Management	____ Management

Do you now work with a specific commodity or commodities?

Yes _____ No _____

If yes, please list.

_____

At what station or institute are you working?

_____

What is your current job title?

_____

How many years have you been involved in agriculture as a scientist (excluding training)?

_____

How many years have you worked for your present research organization (excluding training)?

_____

What was your job title when you began working for your present organization?

_____

B. Work Activities: The following set of questions provides information on your work activities.

During the last year what percentage of your time has been devoted to:

_____% research
_____% administration in agriculture
_____% teaching
_____% extension
_____% travel/conference, etc.
_____% farming
_____% other (specify) _____

Using the categories below: How would you characterize your research during the last 5 years? What do you think it should be?

Actual %		Ideal %
_____	Basic Research (new scientific knowledge)	_____
_____	Applied Research (practical use for existing knowledge)	_____
_____	Adaptive Research (tailor applied to location specific)	_____

What percentage of your research is performed in the following categories: What percentage of your research should ideally be performed in the following categories:

Actual %		Ideal %
_____	Experiment Station Field	_____
_____	Laboratory	_____
_____	Farmers Fields	_____
_____	Other (specify)_____	_____

How many of the following persons are currently working under your direction?

_____ technicians _____ laborers _____ other

Ideally, how many of the following persons should be working under your direction in order for you to accomplish your research?

_____ technicians _____ laborers _____ other

What do you think are the three most important criteria for professional advancement within your institute? What should be the three most important criteria for professional advancement? (1 = most important,
2 = second most important, 3 = third most important)

Actual Criteria:

____ academic/technical qualifications
____ experience
____ peer or supervisor evaluation
____ effort devoted to research
____ research results reported
____ impact/use of research results
____ seminars/conference attended or organized
____ professionalism (i.e. motivation, initiative)
____ organizational policies or attitudes
____ other (specify) _____

Ideal Criteria:

____ academic/technical qualifications
____ experience
____ peer or supervisor evaluation
____ effort devoted to research
____ research results reported
____ impact/use of research results
____ seminars/conference attended or organized
____ professionalism (i.e. motivation, initiative)
____ organizational policies or or attitudes
____ other (specify) _____

What are the three most serious limitations to your career advancement?
(1 = most serious, 2 = second most serious, 3 = third most serious)

____ academic/technical qualifications
____ experience
____ peer or superior evaluation
____ effort devoted to research
____ research results reported
____ impact/use of research results
____ seminars/conference attended or organized
____ professionalism (i.e. motivation, initiative)
____ organizational policies or attitudes
____ other (specify) _____

C. Research Objectives and Resources: The next set of questions provides information about research objectives, resources, beneficiaries, limitations and productivity.

Below is a list of possible objectives of agricultural research. How important is each objective to your research?

Of No Importance				Of Highest Importance	
1	2	3	4	5	Increase agricultural productivity
1	2	3	4	5	Improve protection from insects, diseases, other hazards
1	2	3	4	5	Decrease production costs of farm products
1	2	3	4	5	Expand demand by developing new products or enhancing product quality
1	2	3	4	5	Improve marketing efficiency
1	2	3	4	5	Expand export receipts
1	2	3	4	5	Reduce import expenditures
1	2	3	4	5	Protect consumer health and improve nutrition
1	2	3	4	5	Improve level of rural living
1	2	3	4	5	Promote community improvement
1	2	3	4	5	Develop new knowledge or improved methodology
1	2	3	4	5	Provide input to other researchers
1	2	3	4	5	Improve support services

In conducting research, a number of resources are necessary. Below there is a list of such resources. Please note how adequate each of these items are in your current research. Then indicate how important each resource is for the success of your research. They are divided into 4 general categories.

How adequate?						How important?				
Very Adequate				Very Inadequate		Very Important				Very Unimportant
1. Personal - factors which will demotivate or dissatisfy researchers if they are not adequate.										
1	2	3	4	5	Financial support for self and family	1	2	3	4	5
1	2	3	4	5	Suitable living conditions	1	2	3	4	5
1	2	3	4	5	Job security	1	2	3	4	5
2. Administrative - factors required to successfully support a research activity.										
1	2	3	4	5	Operating supplies and materials	1	2	3	4	5
1	2	3	4	5	Transportation	1	2	3	4	5
1	2	3	4	5	Availability of experimental land	1	2	3	4	5
1	2	3	4	5	Equipment and tools to use in research	1	2	3	4	5
1	2	3	4	5	Office and laboratory facilities	1	2	3	4	5
1	2	3	4	5	Availability of labor	1	2	3	4	5
1	2	3	4	5	Quality of labor	1	2	3	4	5

How adequate? Very Adequate ... Very Inadequate						How important? Very Important ... Very Unimportant				
1	2	3	4	5	Scientific literature/ Library	1	2	3	4	5
1	2	3	4	5	Availability of trained technical help	1	2	3	4	5
1	2	3	4	5	Quality of trained technical help	1	2	3	4	5
1	2	3	4	5	Availability of advice from experienced researchers	1	2	3	4	5

3. Professional - factors which positively motivate researchers.

1	2	3	4	5	Personal freedom to determine research problems	1	2	3	4	5
1	2	3	4	5	Contact with other scientists	1	2	3	4	5
1	2	3	4	5	Opportunities for your advanced education	1	2	3	4	5
1	2	3	4	5	Opportunities to gain scientific recognition	1	2	3	4	5
1	2	3	4	5	Opportunities for professional advancement	1	2	3	4	5
1	2	3	4	5	Opportunities for promotion based on merit	1	2	3	4	5
1	2	3	4	5	Opportunities for training people who work under your direction	1	2	3	4	5
1	2	3	4	5	Opportunities for practical implementation of outputs	1	2	3	4	5
1	2	3	4	5	Opportunities to publish research findings	1	2	3	4	5

4. Organizational - factors which influence performance by creating expectations.

1	2	3	4	5	Scientific training of management	1	2	3	4	5
1	2	3	4	5	Management's reputation for scientific achievement	1	2	3	4	5
1	2	3	4	5	Organization's reputation for scientific achievement	1	2	3	4	5

Do you believe that your research results over the past 5 years has or will benefit any of the following? In your opinion who should your research benefit?

Will or Does Benefit Not at All ... A Great Deal						Should Benefit Not at All ... A Great Deal					How do the beneficiaries receive the information
1	2	3	4	5	Scientists in own discipline	1	2	3	4	5	_____
1	2	3	4	5	Other scientific disciplines	1	2	3	4	5	_____
1	2	3	4	5	Small farmers	1	2	3	4	5	_____
1	2	3	4	5	Agri-business	1	2	3	4	5	_____

Will or Does Benefit (Not at All … A Great Deal)		Should Benefit (Not at All … A Great Deal)	How do the beneficiaries receive the information
1 2 3 4 5	Rural residents	1 2 3 4 5	_____
1 2 3 4 5	General public	1 2 3 4 5	_____
1 2 3 4 5	Extension	1 2 3 4 5	_____
1 2 3 4 5	Farming Systems Research Groups	1 2 3 4 5	_____
1 2 3 4 5	Local or state governmental agencies	1 2 3 4 5	_____
1 2 3 4 5	Federal agencies	1 2 3 4 5	_____
1 2 3 4 5	foreign groups, institutions or governments	1 2 3 4 5	_____
1 2 3 4 5	Other	1 2 3 4 5	_____

Please rank the 3 most serious limitations to your research? (1 = most serious, 2 = second most serious, 3 = third most serious)

_____ availability of supplies/equipment
_____ availability of administrative support/advice
_____ availability of funds for research
_____ availability of technical support
_____ lack of clear direction
_____ lack of opportunity to define research problems
_____ lack of personal interest/motivation
_____ lack of adequate reward structure

What criteria <u>are used</u> to measure your research productivity? List in order of importance.

1. _____
2. _____
3. _____
4. _____

What criteria do you think <u>should be used</u> to measure your research productivity? List in order of importance.

1. _____
2. _____
3. _____
4. _____

List your most significant contributions in the past 3 years.

1. _____
2. _____
3. _____
4. _____

F. <u>Management</u>: The following question provides information on management activities.

Listed below are different management activities. Which three have you found the most difficult to perform to your satisfaction? (1 = most difficult, 2 = second most difficult, 3 = third most difficult)

_____ Evaluating past activities
_____ Implementing policy and planning priorities
_____ Talking to staff about their problems
_____ Maintaining physical facilities
_____ Improving morale of non-professional staff
_____ Improving use of operating resources
_____ Communicating with farmers and other clients
_____ Maintaining effective control and discipline on staff
_____ Obtaining additional resources
_____ Monitoring on-going activities
_____ Other (specify) _____

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