RESEARCH MANAGEMENT LEARNING PACKAGES

Module Subject:

Interdependence of Research and Support Services

CANADA

RESEARCH MANAGEMENT LEARNING PACKAGES

Module Subject:

Interdependence of Research and Support Services

Preface

Management in research has come of age. There are three major features of this development.

First, while traditional research is usually narrow in scope and focused on a single discipline, present-day researches are usually interdisciplinary, requiring the participation of several researchers coming from diverse disciplines. With the tendency of high-caliber researchers to be strongly individualistic and independent, the management of an interdisciplinary group of researchers working on a common problem requires different skills transcending technical expertise.

Second, research organizations are getting bigger, becoming more complex and more bureaucratic. There is an increasing number of complementary functions, such as data management, experimental facilities management, research and extension linkage, etc., that have to be wedded with research. These would thus require a high degree of management expertise.

Third, there is an increasing demand for research to solve development problems. Before, the generation of knowledge was the major reason for research. Today, research is required to convert this knowledge to viable solutions to urgent problems of society. A research institution must, therefore, deal not only with researches but also with end-users, politicians, entrepreneurs, industrialists, organized groups, funding agencies, mass communicators, technology transfer institutions and other development agencies.

Where then will this new breed of managers come from? Are the managers of business enterprises and other non-research institutions not eligible as research managers? We think that research managers need to have expertise in both management and research. To be effective in directing scholars and researchers, one has to earn peer credibility and professional respect. The successful research manager therefore has to be a respected man of science, as well as a proficient manager and administrator. Herein lies the distinctiveness of research management.

Considering that the process of adding research expertise to professional managers is more difficult than adding management expertise to researchers, it seems that the most feasible source of good research managers is from within the research system itself. To do this, however, there is a need to deliberately enhance and develop the managerial expertise of scientists/scholars through a well thought-out training program.

Toward this end, the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) and the Research Management Center (RMC) of the University of the Philippines Los Baños (UPLB), with support from the International Development Research Centre (IDRC), join hands to satisfy this need. Our product is a series of learning modules designed to consolidate and package learning materials into syllabi, cases and source materials for short-term and long-term courses in research management. Each learning module consists of a lesson plan, teaching cases, expert's analysis, source monograph, visual support and self-evaluation. The modules were so designed as to enhance learning through an approach whereby students/ participants engage in a more active process of knowledge acquisition. The modules could be used in a self-paced learning schedule where the student/participant would be able to proceed without the presence of the instructor. Moreover, the learning packages could be used singly or as a set of modules for a specific course or degree program. It is hoped that through this effort those involved in managing the complex process of research will internalize the principles, frameworks, perspectives and philosophies as well as derive learnings from reality-based experiences in the world of research management.

This particular module is one of 26 modules covering the following subject-matter areas:
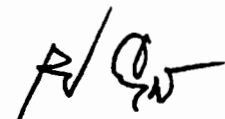
o   Bureaucracy in Scientific Organizations
o   Information Systems Management
o   Interdependence of Research and Support Services
o   Budgeting in Research
o   Coordination in Scientific Organizations
o   Managing Disciplines in Scientific Organizations
o   Management of Change in Scientific Organizations
o   Systematic Managerial Analysis

o   Resource Generation
o   Organizational Development and Principles of Administration
o   Organizations and Systems of National Agricultural Research
o   Research-Extension Linkage Management
o   Communication-Extension Campaign
o   Communication Planning and Presentation of Research Programs
o   Formulating Research Plans and Programs
o   Agricultural Research Policy: Issues and Process of Formulation
o   Organizational Behavior of Research Institutions
o   Managerial Leadership in Research Systems
o   Motivating Knowledge Workers
o   Networking and Scheduling Techniques
o   Personnel Management Systems for Research Institutions
o   Technology Assessment and Evaluation in R & D
o   Public Relations in Research Systems
o   Financial Management for Research Systems
o   Creativity and Research Management

We wish to express our gratitude and appreciation to the
following institutions and individuals who provided the project
assistance and cooperation without which this project would
not have been born and completed: to **IDRC** for providing
financial assistance; to **UPLB**, for making its faculty and
staff available to participate in this project, and to the
many module developers who labored for weeks to come up
with their module output. We also would like to extend our
appreciation to Ms. Ma. Theresa H. Velasco who edited the
manuscripts and made them look good and easy to read.
Finally, to our workforce, Dr. Melinda F. Lumanta (Senior
Researcher), Ms. Ma. Theresa A. Baril (Research Assistant)
and Ms. Ma. Magdalena L. Junsay (Secretary), our appreciation
for their labor of love on this project.

Dr. Arturo A. Gomez
Director, SEARCA

Dr. Rogelio V. Cuyno
Director, RMC

Los Baños, Laguna, Philippines
October 1989

Module Subject:
INTERDEPENDENCE OF RESEARCH AND SUPPORT SERVICES

Table of Contents

LESSON PLAN

Need

Success in scientific research is primarily a result of synergistic interaction among the researchers, the support system and the research manager or administrator.

Researchers can be more productive when they devote their time and energy wholly to research activities. The support system, on the other hand, is supposed to take care of those functions (e.g. logistics and financial matters) that are likely burdensome to the researchers but are essential in an organized research. An understanding of how the research system works can help the support service personnel truly be supportive and facilitative in achieving the goals and objectives of the research organization.

Purpose

The intent of this module is to present the problems/ difficulties arising from chronic confrontation between the research system and support system in a research organization. It is intended to stimulate exchange of views among the participants, based on their own experiences to bring out principles that will improve the working relationship between these two units of a research organization.

Learning Objectives

Specifically, the participants are expected to:

1. Identify the common bottlenecks that hinder a smooth working relationship between the researchers and support staff;

2. Share their solutions and experiences on these problems; and

3. Draw guiding principles that will improve research-support staff working relationships.

Content
Outline

1.0 Introduction

2.0 Overview of Research Culture

3.0 Overview of Administrative Culture

4.0 Understanding Bureaucracy

5.0 Problems in Relationship Between Researchers
and Support Staff

6.0 Overview of Conflict

6.1 Definition of conflict
6.2 The conflict process
6.3 Consequences of conflict
6.4 Conflict resolution

7.0 Harmonizing the Relationship Between Research and
Administrative Culture

7.1 Cooperation
7.2 Interdependence
7.3 Coordination
7.4 Communication

******

THE CASES
Beyond Number People

Herky del Mundo

Narrator: When scientific research is set in motion, a network of professionals comes to life. A world abound with scientific acumen, as well as management and administrative capabilitiies, that pave the path to important scientific discoveries - - research findings that nurture an environment that hungers for change. As a distinct species in an organization called *the number people* . Sometimes they are looked up to, at other times treated with contempt. But there's no doubt about their role in an organization. They are the ones who hold on to its purse string, and oftentimes tightly to protect the organization's well being.

They come under different names. They are called accountants, budget officers, auditors, purchasing and personnel officers. People who make up the administrative unit of any organization.

They are guided by a highly disciplined system, guardians of procedures that generally make them unpopular with the rest of the organization. That is why they have earned the monicker, number people.

Numbers preoccupy them and matter so much in their avowed mission to help run the organization efficiently.

In today's environment, where rapid changes require more flexibility from organizations wanting to get ahead, the number people have a significant role to play.

Their response to this rapid changes will influence the organization's readiness and survival in the future.

This is especially important in a highly specialized field like scientific research.

This type of operation, especially in the developing Third World, is tasked with a mission to fulfill. There is a sense of immediacy to apply the findings and discoveries to alleviate a widespread need in the environment.

Towards the attainment of this mission, the number people assume a significant role in the success of scientific research. They must recognize and appreciate that they have an added social and moral obligation.

A situation that calls for adapting procedures as well as attitudes to help attain the mission of scientific research.

What comes next are three cases which highlight conflicts between administrative staff and researchers. This exercise requires your participation. You are requested to evaluate the cases based on your own thoughts and experiences. After each case, general guide questions are provided. A discussion of the issues hopefully will clarify your role in scientific research.

CASE 1
THE CASE OF THE LOWEST BID

Narrator: In this case, we have Mr. Efficient, twice-winner of the model employee of the year award. True to form, he punches the bundy clock at the proper time. His co-employees know that underneath his simple looks is a badge of honesty, which is especially important in his job. He is the purchasing officer.

Project
Leader: Hey, partner, how is my order of rice bran coming along?

Mr.
Efficient: I have contacted several suppliers already. But we'll try new ones too so that we'll have a good indication of the market.

Project
Leader: Good. But don't forget the technical specs. The quality of the rice bran has to be just right for the project.

Narrator: People love to work with Mr. Efficient. They know that he is dependable. *(Mr. Efficient goes over the yellow pages. Calls.)*

Mr.
Efficient: Yes, I need a quote on your rice bran. *(He also thumbs through his personal directory. Dials and calls.)*

Narrator: No doubt, Mr. Efficient loves his work.

(His movement pixilliates. He moves fast, finishes paper work, and gets bids and eventually supply.)

Narrator: Soon, the swine fatteners were feeding under rice bran diet. The project was a research on the effects of feeding different levels of rice bran on the growth of swine fatteners.

But what Mr. Efficient did not know and to the surprise of the project leader, the winner of the bid, the person who gave the lowest bid, adulterated the rice bran. Mr. Efficient failed to notice this for when he looked at the supply, the product seemed to be in order. In due time, the project leader noticed that the swine fatteners were not performing as expected. He soon found out about the adulteration, and decided to confront Mr. Efficient on this.

Project
Leader: I have made an analysis on the supplies, and they do not meet the standards we've set. Did you check the supply upon delivery?

Mr.
Efficient: I made a visual inspection and it appeared all right, judging from our previous experience.

Project
Leader: Visual inspection is not enough. You should have checked it against technical specs.

Mr.
Efficient: If you are so concerned with quality, why didn't you send one of your boys to check it.

Project
Leader: But that's your job. And another thing we never have problems with our previous supplier. So, why didn't we get from him this time?

Mr.
Efficient: I never got that feedback. So it was on the basis of price in which I decided. The lowest bidder promised that he would meet the technical specs!

Project
Leader: Did you ask for an analysis on this delivery?

Mr.
Efficient: I did. Here..

Project Leader:	No wonder the rice bran is low in crude protein. This is just 5 percent. We need 10 percent.
Mr. Efficient:	I thought that was still acceptable. The supply didn't look much different from the batch we had. If you feel we're not getting the right results, let me conduct another bidding.
Project Leader:	Yes, but it's too late. We have to start the experiment all over again.

Discussion Questions:

If the experiment continued with the adulterated diet, the research results would have been spurious.

1. What was the main problem in this particular case?

2. Why did the problem occur?

3. How could the situation have been avoided?

CASE 2
TO JUGGLE OR NOT TO JUGGLE

Narrator:	The next case deals with a classic dilemma. If Hamlet were a budget officer, he would surely be in trouble. To juggle or not to juggle is the classic question that plagues budget activities. How far does one go if funds, due to extreme need, have to be reallocated? Before jumping to an answer, let's analyze this next case.
	A project on canning sweet corn varieties was launched. It was a big project that involved vertical integration from production to processing and up to marketing.
	A promising project indeed, until the purchasing officer found out that the price of can sealer in the market had gone up by 25 per cent from the time he made the canvass.

He immediately talked with the project leader. They both felt that if the project has to go on smoothly they have to get additional funds from the personal services allocation.

But first they have to get the nod of the budget officer. Her reply

Budget Officer: Rules are rules. Only budget for items within equipment outlay can be interchanged. Personnel funds cannot be juggled to buy equipment.

Project Leader: I know this rule. But I have no other option except to juggle funds. As you know the corn in the field is ready for harvest. If we do not do it now the sugar content will decrease. But we cannot harvest unless we have the can sealer.

Budget Officer: It's not my problem. My concern is to see to it that the budget is properly allocated.

Project Leader: But price increase is beyond our control.

Budget Officer: I'm sorry. Your only option would be to use up your contingency fund. But if that is not enough then, there's nothing I can do about it.

Narrator: With the refusal, the project leader canceled the purchase of the equipment and resorted to renting an old can sealer which was less efficient. As a result, the marketing study was affected. The expected output was not met. The research institution suffered from credibility in the eyes of the funding agency.

Discussion Questions

1. Was there no way out of this problem?
2. When can transfer of funds be justified?
3. What could have been done to get the equipment?

CASE 3
THE ANXIETY-DRIVEN RESEARCHER AND THE COOL ACCOUNTANT

Narrator: The next case is a story of two characters. One character is a capable and analytical researcher. People recognize his creativity, but are also turned off by his eccentric behavior.

Having embarked on a project, he is seized with a sense of excitement as well as anxiety. Looking at his timetable, he knows something will go wrong unless he gets the initial fund release.

(Researcher picks up phone. Dials, fingers betray tension. Talks.)

Researcher: Hello! Accounting?... Oh, yes. This is Mr. Tanjuico. I would like to talk to you about our new project. You see, the season for planting sorghum has already started and we need to hire emergency laborers to control the weeds in the experiment. *(Pauses.)* My project staff has already started the planting. The experiment has to start at the proper season, you know.

So, I need your certification of fund availability so that personnel can hire the emergency laborers now. *(Listens.)* What?....But the budget has been approved in principle so I don't see any reason for the delay.

Narrator: Mr. Tanjuico, from all indications, is in a bind. To take advantage of the planting season for sorghum, he has instructed his staff to do the work even when the budget for the project has not been approved. But subsequent tasks in the project require fund releases.

Researcher: The weeds are starting to grow that's why I need the weeders badly. I need the weeders now. If weeds are not controlled, we won't be able to find out the optimum fertilizer for sorghum. *(Pause.)* Yes, but....Ok, I'll come over to discuss it with you in person.

Narrator: The other character is a cool and efficient accountant. She is quite helpful, as long as people follow procedures. To her mind, this is necessary to provide the proper controls for an efficient operation.

Researcher: My problem is the weeds are starting to grow. And I don't have the manpower to do the weeding.

Accountant: I understand you need four emergency laborers...

Researcher: Yes... I need weeders. You see, weeds compete with the sorghum for the soil's nutrients. If the weeds grow they will ruin our experiment. How will we find the optimum fertilizer for

sorghum?

Accountant: I do appreciate your problem. But you see your budget has not been approved yet.

Researcher: But it has been approved in principle. It provides for four emergency laborers. What I need is your certification so personnel can start hiring the laborers now.

Accountant: But how could I do that? No money has been allocated yet.

Researcher: But the money will come. The budget has been approved in principle.

Accountant: But if the money doesn't come, I'll be held accountable.

Researcher: Listen. Can we not just use the last quarter's savings of one of our projects until the next budget release?

Accountant: But that is not done, Mr. Tanjuico. I cannot possibly certify using unallocated funds.

Researcher: But the weeds will grow. If the weeders don't come, they will jeopardize the whole project.

Accountant: I'm sorry. The only way I can help you will be to expedite the papers once the budget has been approved. If the budget is on its way then delay might only be a matter of days.

Researcher: But I don't have the time. The weeds will affect the experiment in just a matter of days.

Narrator: Our researcher had no recourse but to comply. By the time the budget has been approved, the following is the situation:

Weeks before, Mr. Tanjuico's project staff had done the planting. Without enough weeders, the weeds grew healthy and in abundance. By the time the papers for the laborers were processed, the situation was:

The weeds had already outgrown the sorghum. The project was was was aborted. There was need to replant, but the staff had to wait for another season.

Project timetable, in other words, was thrown off.

**Discussion
Questions:**

1. Discuss a scenario that would have been different from the above.
2. What went wrong in this case? Where did the bottleneck occur?
3. What could have been done to save the project?

******

This production script was written for a video documentary entitled **"Beyond Number People"** based on articles prepared by **J. A. Saludadez and J. C. Reyes.**

Herky del Mundo is the President of Del Mundo Media Inc.

EXPERT'S CASE ANALYSES
(Please Read Only After Answering the Case)

EXPERT'S CASE ANALYSIS

Jean A. Saludadez

Introduction

Three cases were presented which show the interface between the research process and the administrative procedure and the interaction of the researchers and the administrative staff when no clear flow of communication exists between them. The clearing tool/mechanism is the understanding of the uniqueness of scientific research management by both sectors in the research organization.

As in the first case, the **"Case of the Lowest Bid,"** the awarding of bid based on the lowest bidder became a problem because the quality of feeds had been sacrificed for cheaper price of feeds. Two factors contributed to the problem which are:

1. *The purchasing officer.* He was so concerned with economy to the point of compromising the quality of feeds. He was uninformed and unaware that the five percent difference in the feed composition matters much in research work (five percent difference in rice bran is equivalent almost to one-half of the required crude protein content). This was further manifested when he suggested to do another bidding, not realizing the damage done by the adulterated rice bran to the research results and to the whole research project.

2. *The project leader.* He assumed that the purchasing officer understood the technical requirements of the research that he left all the canvassing to the purchasing officer. If he had only provided feedback to the purchasing officer that the researchers were satisfied with the previous supplier, then they might have saved all costs incurred in canvassing and bidding.

The situation could have been avoided if:

1. the purchasing officer selected the bidder who met the technical specification regardless of the price (as long

as it is not overpriced);

2.   the purchasing officer had consulted the researchers to know the acceptability of the delivered supplies;

3.   the project leader or the researcher had a complete specification of the feeds and indicated at least one reliable supplier;

4.   a dialogue had been held among the project staff participated in by both the research and administrative people involved before the project was implemented. This would clarify for them the objectives of the research and the role each one would be playing for the fulfillment of the objectives (and the completion of the project); and

5.   there had been a standard system and procedure that would facilitate the communication.

The problem shown in the next case, **"To Juggle or Not to Juggle,"** was the legalistic, rigid and uncompromising budget officer who adhered to the standard operating procedures without exceptions. The budget officer was unaware of the nature of research activities that she did not realize her inflexibility would affect the research activities. Like in the first case, there must be a way (like dialogue, systems and procedures) where the budget officer would know the idiosyncrasies of research work and where rules and regulations would be fitted to the nature and culture of research.

What the research organization needs is a budget officer who is considerate about the financial requirements of the researchers and who is creative enough to generate options and approaches to financial difficulties of research projects. In this connection, it is imperative for the research management/ organization to involve the budget people in the planning of research projects.

In the last case, **"The Anxiety-Driven Researcher and the Cool Accountant,"** the problem was the accountant's rigorous and stringent interpretation of procedures. Her routinary work blinded her understanding of research activities. Being in the supportive role, the accountant like the budget officer should be creative in searching for solutions to the problems of

research. She should also realize that research requires immediate attention and should be given exceptional treatment. As in the first two cases, the accountant should be involved in planning the research work and the finance and other administrative department should invite the researchers in formulating the roles and policies in purchasing, budgeting and accounting that would definitely affect them in the conduct of research.

Evident in all three cases presented was the misunderstanding of roles of both the research and administrative people leading to their adversarial relationship. To mitigate the impact of such problems and to avoid future misunderstandings, a continuing dialogue among them should be held to foster harmonious relationships. Likewise, training or orienting the administrative staff on the research process and the research staff on the administrative procedures can also create a system of working relationships appropriate to a research organization. Other traits such as flexibility and accommodation can be developed after they have realized their complementary functions.

With the discussion of the three cases, it is hoped that you have gained new insights on your work and that these cases have revealed various issues that can be considered when conflict arises in pursuing your duties in a scientific research operation. An underlying factor in the issues is your own perception of what the research process is.

Remember this mnemonic device: **ECUA.**

The research process is characterized by: **Empiricism, Creativity, Uncertainty, and Autonomy.** *Empiricism* requires that findings are supported by objective, verifiable evidence. Research is a complex, highly objective task where procedures or materials should not be compromised.

The research process cannot be undertaken without *creativity*. Research is primarily a creative work. A lot of accidents, occur or unexpected inputs come up that may have not been reflected in the original budget.

This is related to the next characteristic, *uncertainty*. The nature of science is that discovery is unpredictable. Ideas cannot be hardbound by schedule.

Lastly, research needs *autonomy* or independence. There has to be an absence of pressure on the researcher as regards choice of research subject, methods, and time to pursue an objective.

ECUA, or the four characteristics merely show that a scientific institution has special needs. Administrative procedures can and should be adopted to support its objectives. To foster a more meaningful relationship between administrative personnel and researchers, here are some management tips:

1. Orient all parties concerned on the mission of the scientific institution. Setting objectives in advance establish what people should work for.

2. Manage for accountability, not control. Since research is a highly complex task, imposing controls may prove detrimental. Administration can still be effective even if it facilitates the work of the researcher as long as they are held accountable.

3. Be aware that final product in research cannot be predetermined. Thus, there is a general need to be flexible and adjust accordingly when occasion warrants it.

4. Acknowledge that research management is a unique and complex task. In this area, two opposing disciplines are united: creative research and a controlling management. Thus, inherent in a research system are unique management problems which do not lend themselves to the application of standard administrative procedures.

5. Manage for creativity, not for routine productivity. Research management is not supposed to control scientists, but to facilitate the discovery of new knowledge and technology.

6. Promote communication. Keeping people informed of what the goals are and the progress of the projects gives people a sense of participation in the research work.

7. Encourage coordination between researchers and administrative personnel. Support staff should be aware of the objectives of the research.

On the other hand, researchers should be more tolerant of the support staff and learn to work within the system.

The list can go on depending on the unique experiences of your institution. But the bottom line is: there should be enough elbow room to create a synergy in the organization. Accomplishment of the institution's mission does not depend only on the scientists but also on the support staff who help run the organization.

******

Jean A. Saludadez is a Research Staff of the Research Management Center, College of Economics and Management, University of the Philippines Los Baños.

SOURCE MONOGRAPH
The Uniqueness of Management
of Scientific Research

Jean A. Saludadez and Jaine C. Reyes

Introduction

Man cannot deny the contributions of research to improve his activities. Through the ages, technology, the product of research has been highly acclaimed as the prime mover of society's progress. Scientific research is regarded as the keystone of civilization.

Simultaneous with social change is the change in the conduct research process. Research, which used to be a one-man endeavor becomes a complex interaction of human and material resources.

The Nature and Culture of the Scientific Enterprise and Processes

Science is generally defined as the systematized body of knowledge on natural phenomena and the laws that govern them. Research, on the other hand, is the human activity directed to the advancement of science.

The Assumptions of Science

Nachmias and Nachmias (1981) outline the following six fundamental assumptions of science which are necessary in understanding the scientific approach:

1. **Nature is orderly and regular.** Science assumes that regularity and order exist in the natural world and even in a changing environment.

2. **We can know nature.** Natural phenomena exhibit sufficient, recurrent, orderly and empirically demonstrable patterns ideal to scientific investigations. Likewise, the human mind is capable of knowing nature, as well as itself and the mind of others.

3. **Knowledge is superior to ignorance.** Closely related to the assumption that we can know nature and ourselves is the idea that knowledge should be pursued both for its own sake and for perfecting human conditions.

   Because scientific knowledge is tentative and changing, we can know the things that we did not know in the past. That is, our current knowledge can be modified in the future. Truth in science is relative to the evidence, the methods and the theories employed.

4. **All natural phenomena have natural causes.** It implies that natural events have natural causes or antecedents. This assumption directs scientific research away from omnipotent supernatural forces and toward the regularity and order of natural phenomena.

5. **Nothing is self-evident.** Tradition, subjective beliefs, and common sense could not be exclusively relied upon in the verification of scientific knowledge. Claims for truth must be demonstrated objectively and even the simple notions call for objective verification because possibilities for error are always present.

6. **Knowledge is derived from the acquisition of experience.** If science is to inform us about the real world it must be empirical; that is, it must rely on perceptions, experience and observations.

The Mission and Purpose of Scientific Research

Research, as a human activity, has a mission to enlighten man of his nature, his existence and his relationship with nature and environment so that he will:

1. have greater control of himself and his environment;

2. gain knowledge and understanding of those things needed to facilitate his decision making; and

3. continually improve the state of the arts that will increase the efficiency of his performance.

Relatedly, the outputs of research such as scientific observation, organized knowledge, tested propositions, confirmed theories, discovered natural and tested technologies, are all for the service of man.

The Research Process

The research process encompasses all the activities that are necessary to arrive at the systematic organization of knowledge about the material universe. It is the application of the scientific method. It also follows a number of logically sequenced steps such as:

1. **Identification of a problem.** The question or problem which you seek answers for.

2. **Exploration or review of previous work done.** An extensive review of available literature should be done to avoid unnecessary repetition or duplication of studies and to enable the researcher to decide the most logical, most plausible and most fruitful approaches, techniques and tools for the problem at hand.

3. **Formulation of specific objectives.** The objectives should be measurable and attainable within a given set of resources and time.

4. **Formulation of hypothesis or scientific conjecture.** Hypotheses will explain provisionally certain facts that may serve as a guide on how to tackle the problem.

5. **Construction of a research design.** The design includes the selection of techniques to be used in solving the problem and the reason for the choice of the techniques.

6. **Gathering of data/testing the hypothesis.** This is already the implementation of the experiment.

7.   **Interpretation of data.** Data are analyzed according to the techniques in the design.

8.   **Drawing of conclusions and implications.** All that will be discovered in this step will be assimilated into the corpus of knowledge.

9.   **Writing of a scientific report for publication.** Research should be disseminated to other people through this step.

Aside from these steps, the research process has unique characteristics which imply the idiosyncracies of research work. They are as follows:

1.   *Creativity.* Research is primarily a creative work and creativity brings into existence innovation for the first time;

2.   *Uncertainty.* In science, discovery is unpredictable, results cannot be forced or predicted, ideas cannot be generated within schedule;

3.   *Empiricism.* The assertions of truth are supported by objective, verifiable evidence.

4.   *Autonomy and Independence.* The absence of pressure on the researcher with regard to his choice of research problem methods and the deadline will facilitate his creativity but he should be reminded about the requirements of the organization.

Models of Science

Scientific work is performed in three archetypical models or settings which are (Mason, n.d..):

1.   **Classical ("Title") science.** It depicts the scientist as an inquisitive individual systematically, applying the scientific method to solve problems of deep personal interest. The scientist is perceived as a solitary scholar in the dingy garret or kitchen laboratory. Copernicus in his lonely tower at Fravenburg Cathedral, Newton in his

study in Cambridge and Pasteur in his laboratory in Strasbourg.

2. **Large-scale organized ("big") science.** It is modern high technology, bureaucratic, discipline-oriented science exemplified by the Manhattan Project on the Apollo moon shot. This model prevails in modern physics research with its requirements for particle accelerators, astronomy with its requirements for powerful telescopes and oceanography with its requirement for large, well-equipped sea-going vessels.

3. **Applied policy science.** Like classical science and organized science, it seeks to produce true conclusions. But, unlike both classical and organized science which seek conclusions in terms of the discovery or confirmation or universal laws, applied policy science seeks conclusions to guide behavior in social systems. Policy science is more normative, problem-oriented and multidisciplinary. It is characterized by an active and worldly scientist advising key policy makers (i.e., the State's president, corporate executives, labor leaders, mayors, educators, etc.) on courses of action to follow based on the systematic collection of date and the scientific analysis of the policy makers problem.

Characteristics and Idiosyncrasies of Researchers

What we now know as a vast body of scientific facts and principles was brought into existence through the relentless persevering man of research - the research scientists (Good and Scates, 1954). Generally, scientists belong to type of individuals who are inductive thinkers or logicians. They see the common thread in apparently unrelated happenings. From their observation and experiences, they synthesize and develop generalization and laws (Pathak, 1976).

Heiman (in Arnon, 1968) distinguished two groups of researchers: the "thinkers" and the "workers." The "thinker" has a good knowledge of literature, including subjects outside his own field. He is unorthodox in his approach to problems.

He may be busy with a lot of activities but he appears to produce little. He is allergic to administrative control.

The "worker" has an orderly approach to problems which he solves with well-proven methods and perseverance. He is aware of the latest developments in his field, but he has little interest in areas outside his field. He is best at solving pressing problems, provided that the objectives are well defined. He does not, as a rule, show resistance to administrative control.

Heiman further points out that many researchers fall in continuum between the extremes of "thinkers" and "worker". Levinson (n.d.) further elaborated the scientists' personalities. The scientists, according to Levinson, are:

1. intellectually gifted;
2. investing in intellectual things;
3. persons with strong feelings that what they were doing was good and could be done only by them;
4. intellectual rebels, i.e. they reject old knowledge and search for the new;
5. looking for freedom of and opportunities for self-expression; and
6. primarily creative.

Likewise, scientists are more interested in their work than in other people; they perceived that their work provides them with both gratification and recognition and encourages them to think and act independently.

Moreover, the scientist has different frame of reference. For evaluating his scientific performance, the scientist is dependent upon his or her scientific colleagues equally knowledgeable in the field, but for evaluating his contribution to organizational goal, he is dependent on management.

The scientist also has dual loyalties or two obligations: to his employer and to his scientific colleagues. To him, both have the same importance, so, the scientist must always meet two sets of standards: productivity and professional sophistication.

In general, two distinct categories describe the *mental attitudes* of scientists: the speculative type (perfectionist) and the

systematic (Pathak, 1976). Similarly, Charles Nicolle (in Pathak, 1976) differentiated two types of scientists:

1. The inventive genius who is not necessarily a storehouse for knowledge and highly intelligent. He uses intuition and only calls on logic and reason to confirm his findings.

2. The scientist with a fine intelligence who classifies, reasons and deduces but who is incapable of creative originality or making original discoveries. He advances knowledge by gradual steps like a mason putting the bricks one after another until the structure is finished.

Furthermore, the researchers are persons with different personality traits: some are outgoing while others are introvert: some are good in oral expression while others are good in writing (Perez, n.d.); some are liberal in sharing the credit and work, while others do not accommodate the needs of others; some have cordial relations with their colleagues and subordinates, while others maintain a strictly formal personal relation with colleagues and subordinates (Pathak, 1976).

In addition, the scientist's public image is different from the other professionals. The public view him as nearsighted but farseeing, brilliantly innovative but absent-minded widely acclaimed but impervious to applause, capable of abstract thinking but naive and eccentric in everyday reasoning (Levinson, n.d.).

Meanwhile, some management personnel have some perceptions on the scientists. They perceived the scientist as:

o   has the tendency to be opinionated;
o   attracted by what is bizarre and unusual;
o   perennial rebel who will not conform to organizational procedures;
o   a person who resents encroachment on his autonomy;
o   primarily governed by professional standards rather than by organizational objectives;
o   confirmed individualist with an ingrained propensity to work alone;
o   a person who resents administrative and non-scientific occupations;
o   jealous of their prerogatives; and

o   a person who doubts the professional competence of colleagues.

The scientists share the *tradition and values* not similar to other professionals. In the past, the typical scientist worked in an academic atmosphere of his own choosing, imbued with academic values and oriented towards independent research. Thus, the conventional view of the research scientist portrays him as an individual who is motivated by intellectual curiosity which can only be satisfied by an objective, dispassionate examination of facts, (Mason, n.d.). He is a scholar whose curiosity pushes him to work independently and to solve problems of deep personal interests.

The research worker, by training and inclination, wished to engage in research that is scientifically rewarding, that will increase his standing with his peers and that will promote his own career most effectively. He usually prefers a free, uncommitted research to practical problem-oriented research.

The average research worker or scientist is oriented more to his own discipline than to the institution. He feels that he is the sole arbiter of what is needed and what should be done in his field. This trend has become even more marked with increased specialization. In addition, he shows little concern with institutional problems and decisions if they will not affect his own personal work or that of the small group to which he belongs. As a result of this individualistic approach, the scientist resists intrusions in his area by his superiors and colleagues and considers the organization obligated to supply his needs (Arnon, 1968).

Leading and Motivating Researchers

The above discussion on the characteristic and idiosyncrasies of researchers/scientists, implies that they require an appropriate approach or method of leading and motivating. The scientist is a productive unit and an important component of research, thus, he should be kept productive at the highest level. Since research is a creative work, the researchers can only be productive/effective if the climate or environment for creativity is provided.

And while it is true that the scientists as a class are individualistic, independent, stubborn and self-centered, they also respond to: motivational treatment, direction, persuasion, control, coordinative communication, organizational working arrangements and planning.

Pathak (1976) cited the following characteristics of effective scientists:

1. Effective scientists are self-directed, they value their freedom but they also allow other people to suggest improvements on their research endeavor; they interact well their peers/colleagues.

2. Effective scientists do not limit their activities to pure science, their work is diversified.

3. Effective scientists can be motivated by the same style and strategy that motivated their colleagues.

4. Effective scientists work under creative conditions.

With creative environment as a factor for effectivity, Zialcita (1976) summarized the essentials of a creative environment using Koning's classification as follows:

1. Real and meaningful problems should exists to contribute to the organization's goals as well as develop technical expertise.

2. Technical and non-technical support should be provided.

3. Scientists are given independence to make technical decisions on how to tackle their problems. Scientists should be consulted regarding decisions that would affect their work. That is, participative style of management should exist.

4. Completely open communication should be present to promote interaction, team work and exchange of information and ideas.

5. Work accomplishments should be recognized and criticism should be properly and objectively fedback.

Moreover, the following conditions could create and maintain the researcher's motivation:

1. Freedom to pursue original ideas and to make contributions to basic scientific knowledge;

2. Frequent contact with scientific colleagues, both those who are working in different fields and who have similar professional backgrounds;

3. A management which gives neither complete autonomy not excessive direction, frequently interacts with subordinates, and gives them the opportunity to make their own decisions;

4. Differential reward system; and,

5. Adequate research facilities and conditions.

Aside from the above conditions, Levinson (n.d.) suggested additional ways on how research executives can create and maintain a climate conducive to scientific productivity. These are as follows:

1. Reject the assumption that the scientist is odd. The scientist is different in many ways from other professionals, but his difference makes him valuable.

2. Provide an adequate organizational support. The scientist who is buried in an organizational structure is likely to be suppressed, denied autonomy and facilities to do his work, and not permitted to really be involved in organizational problems. The scientist must know what is expected of him and what kind of support he will have in fulfilling these expectations.

3. Set up a compensation system which fits the scientist's values. He is a professional interested in the development of knowledge.

4. Feedback/communicate your support. When the scientist finds a lack of support from his superiors, he tends to withdraw from them, and the resulting isolation is detrimental to his productivity.

Management of Research
From Independent to Organized
Research/Research System

Traditionally, research is characterized as isolated, monodisciplinary, specialized, private and independent. It's primary objective is the pursuit of truth. It serves a solitary scholar's individual pursuit for academic excellence. However, the individualistic research has passed away and has given way to research organizations where team effort is emphasized. Today, scientific research requires an intricate organization of men. Not only a pool of competent scientists, but also support staff doing administrative and operational work. To be able to produce significant results, scientific research demands a considerable amount of material resources. All these contribute to the growing complexity of doing research.

Historically, the pace and complexity of research was accelerated fist by the industrial revolution and then by the two world wars (Zialcita, 1976). Moreover, the change in the popular attitude toward science and its value to society lead the growth of organized research. The newer attitude to scientific research is looking at it as national investments, hence, should come up with results that are of value to all citizens.

Research System/Organization

The researcher/scientist now has to be a good team worker. Team effort requires a unified direction of all activities toward a common goal or purpose. If the research output is to be maximized, each member of the team should perform his part at the right time. This means that the working units are combined in a way that goals of individuals are consistent with and add up to the total goal of the organization. That is, human and material resources are mobilized toward a unified purpose in order to maximize output in the desired directions.

To realize the demands of team approach, research should be managed. Management is defined as the process of planning,

organizing, leading and controlling the efforts of members and the use of other resources in order to achieve stated goals (Stoner, 1980).

The management of research therefore requires the creation of a key position in the organization that will place a person who will make the right mix of material resources and the harmonious blend of people working in the various aspects of research operation. This key person is the research manager.

Profile of a
Research Manager

Collado (1976) describes the qualities of a good research manager as follows:

1. Technical training and experience in the particular thrust of the organization in science and technology;
2. Ability to get along with people, superiors and subordinates alike;
3. Conceptual ability to fit different parts together into a sensible whole;
4. Decisiveness (not chronic ambivalence);
5. Leadership by competence rather than by hierarchical position which breeds fear more than loyalty;
6. Tempered optimism;
7. Willingness and intestinal fortitude to take risks;
8. Drive and energy;
9. Articulateness; and
10. Ability to project into the future.

Appropriate Management System
to Insure Goal Attainment

the research done more efficiently and effectively the following elements must be present in the management system:

1. Flexible organization structure. The goals of the research system change, so will the form of the organization. Also, the organization should be arranged to take most advantage of the skills and the desires of the people involved. This is necessary for the prolific generation of ideas.

2. Efficient support staff. A research worker requires the support of colleagues in other disciplines and of technical and administrative personnel.

3. Facilities and environment that foster invention. Researchers work best under creative environment.

4. Minimum bureaucratic control. Bureaucratic controls tend to destroy creativity. Regulations are devised for purely administrative units and they almost always hamper research productivity. Special regulations must, therefore, be devised for the research organization which will facilitate flexibility and efficiency. Administrative barriers like accounting procedures, auditing requirements, the application of the civil service rules and laws which are often regressive than innovative should be trimmed down. In other words, researchers should be spared of unnecessary red tape and administrative burden.

5. Collegial relationship. Instituting a good working atmosphere in a research system, recognition of top caliber scientists and employees, and establishing a social climate conducive to research development are necessary for an efficient research systems. These measures could narrow or minimize conflicts which may arise in the system.

6. Interactive communication. Communication gives purpose and meaning to a job. The atmosphere in the system should foster free interchange of information.

7. Recognition. Researchers are human beings, they need recognition and rewards.

8. Less overseeing, more mission-oriented research.

Research and the Administrative System

Research as a system of production has knowledge and technology for its outputs while its inputs or its basic elements/ resources for production are man, money, masonry, methods,

and materials. Only man can give meaning and value to the last four inputs (Pages, 1981). He uses these things to produce the system's outputs.

Within the context of research organization, five groups of men are working -- leader, scientists/ researchers, administrative personnel, technicians, and manual laborers. These groups though mutually interdependent, perform basically different functions and activities (Arnon, 1968).

Ideally, these groups should complement each other to keep research moving. The leaders combine the resources to make the system productive and effective in relation to its goals, the researchers generate the output, and the administrative staff provides support to the research effort. However, these complementary actions are not evident in the Third World research institutions. Problems of authority, policies, rules and regulations, particularly between "administration" and "research" arise among the research personnel (Audet, n.d.).

Such problems arise because first, human relationships are developed among individuals and groups within and outside the system. Relationships exist in policy groups, funding institutions, administrative services in personal regulations, procurement of supplies and equipment, accounting, auditing, liberties, agencies with facilities for information storage and dissemination and international organizations based on regional location or similar environment condition. These relationships become the source of many strains and stresses which exist in the system (Arnon, 1968).

Secondly, these groups are not cleared about their functions in the system. Audet (n.d.) opined that it is relatively easy to lose sight of the fact that research is the prime raison d'etre of a research organization and that the function of the administrative infrastructure is intrinsically that of supporting research. He added that oftentimes the financial administration regarded itself as a policy agency whose objective is to monitor and control the activities of the research institutions through financial controls and restrictive regulations. Similarly, Pinstrup-Anderson (1982) pointed out that need for an organizational structure and administration to facilitate research instead of controlling it is not well understood in many developing countries.

This lack of understanding can be remedied if distinction is made between the organization and administration of research and the organization and administration of routine-type activities.

Research, as mentioned before, is not a routine activity but a dynamic process (Schultz, 1980). Research as a process has its own requirements, special characteristics, difficulties, hazards or uncertainties (Pages, 1981). Furthermore, as a creative human endeavor, success of research depends to a very large extent on the abilities and motivation of the individual scientists, as well as the opportunities afforded him for carrying out his work within a favorable environment. It is important that each scientist is given sufficient flexibility in his daily work and protection against unnecessary control and other bureaucratic obstructions (Pinstrup-Anderson, 1982)

Thus, the administrative infrastructure should not be an obstacle but a means for furthering research (See Appendix A for the functions of the administrative system).

Cooper (n. d.) suggested that administrative staff should consider the following questions as their guide to providing goods and services:

1. How can we best provide the requested services?
2. If request is not justifiable, can we manage to find an alternative procedure of achieving the same objective?
3. Which operation is the most cost-effective in providing the requested services?
4. Should we locally procure the resources or import them?
5. How can we obtain personnel services (by contract, consultancy or direct hiring) if the temporary need for skills are not available among the staff?

Principles in Research Management

So far, this paper has discussed the nature of science, characteristics of the researcher, the perspective of research management, and the relationship of research and administrative system. As a summary, the following are principles in research management that can guide the incumbent and

potential research managers in managing the research system. To manage research efficiently and effectively, the manager should:

1. Acknowledge that research management is a unique and complex task. Research management has united two opposing disciplines, the autonomous and creative research and the regulated, controlled and efficient management. Inherent in a research system are unique management problems which the application of usual administrative and management procedures of business, government and industry could not solve;

2. Manage for creativity not for routine productivity. Research management is not merely managing the scientists but rather managing the atmosphere within which they create and produce new knowledge and technology. That atmosphere included a facilitative organizational structure, a minimum set of restrictive policies, supportive facilities and administrative procedures, and due recognition for the scientists' efforts;

3. Promote Communication. Communication gives purpose and meaning to a job. Keeping people informed of what the organization's goals are and what progress is being made, and giving people a feeling of participation in the work can convey the impression that they are important;

4. Encourage coordination between researchers and support/administrative personnel. Acquaint the support people of the goals and objectives of the research organization and their role in attaining them. Likewise, encourage the researcher to be tolerant with the support staff and learn to work within the system, rather than trying to shortcut necessary procedures. If both sides work together as a team, work will be accomplished in a more efficient and effective manner;

5. Be mission-oriented. Research is conceived not solely for the purpose of producing knowledge but also applying that knowledge into practical tasks aimed at providing people equal opportunities for a better life;

6. Tolerate individual differences. The style in managing a research enterprise should be democratic, one that allows each individual to do things at his own capacity;

7. Stress location specificity. This is especially true to agricultural natural resources which necessitate that the experimentation should be done where the material is originally present to make the research relevant.

8. Recognize the uncertainty of research results. In research, the final product cannot be determined a priori.

9. Use interdisciplinary approach. Modern research involved the cross fertilization of multi-disciplinary perspective because the training and the tools of research scientists are highly specialized. Each research scientist has both relevant skills and blind spots. Hence, not all scientists can analyze all kinds of problems.

With sound management and effective leadership, investments in research are likely to produce high payoffs. With high payoff, society is bound to support more research.

******

Jean A. Saludadez and Jaine C. Reyes are Research Staff of the Research Management Center, College of Economics and Management, University of the Philippines Los Baños.

LITERATURE CITED

Arnon, I. 1986. **Organization and administration of agriculture research.** The Amsterdam: Elsevier .

Audet R. J. undated. **Financial management of research institutions** (handout).

Collado, G. 1976. **Towards a management philosophy in a research organization.** Paper presented at Research Management Training Course, UPLB, College, Laguna.

Cooper, P. undated. **Support systems for research** (handout).

Good, C. , & Scates, D. 1954. **Methods of research.** New York: Appleton Century Crofts.

Institutionalizing research management Asia (mimeographed). undated.

Levinson, H. undated. **What you should know about scientists** (handout).

Mason, 1979. **The role of management in science** (handout).

Mosher, A. undated. **Some critical requirements for productive agricultural research** (Reprint, RMC Occasional Paper).

Murphy, H. 1981. Administration in support of research. **Agricultural research management Asia.** Vol. 3. College, Laguna: Southeast Asian Regional Center for Graduate Study and Research in Agriculture.

Nachmias, C. , & Nachmias, D. 1981. **Research methods in the social science** (Alternate 2nd ed.). USA: St. Martins Press.

Pages, P. 1981. **Opening remarks** (Reprint, RMC Occasional Paper). Regional Research Management Seminar Workshop held in Suweon, Korea.

Pathak, M. 1976. The researcher. **Agricultural research management Asia.** Vol. 1. College, Laguna: Southeast Asian Regional Center for Graduate Study and Research in Agriculture pp.

Perez, C. undated. **Understanding research** (mimeographed).

Philippine cases on agricultural research management. 1982. PCARRD/SEARCA.

Pinstrup-Anderson, P. 1982. **Agricultural research and technology in economic development.** New York: Longman Group Limited.

Schultz, T. 1980. **The entrepreneurial function in agricultural research.**
(Reprint, RMC Ocassional Paper). Paper presented at the Workshop
on Increasing the Productivity and Impact of Agricultural Research,
Indonesia.

Stoner, J. 1980. **Management.** London: Prentice-Hall.

**The growth of organized scientific research and its administrative
implications** (handout).

Zialcita, L. 1976. The research manager. **Agricultural research
management Asia.** Vol. 1. College, Laguna: Southeast Asian
Regional Center for Graduate Study and Research in Agriculture.

APPENDIX A

FUNCTIONS OF THE ADMINISTRATIVE SYSTEM

I. **Personnel.** Normally, the personnel office carries out the following functions:

1. Recruiting staff (all the formalities and practical problems concerned with recruiting);
2. Developing basic/minimum professional requirements for filling positions so that no disparity will exist between departments;
3. Coordinating with budget in planning the overall personnel strength by department or unit;
4. Developing job descriptions;
5. Reviewing staffing requirements continuously;
6. Establishing and disseminating to all employees the personnel policies and the rules and regulations of the organization;
7. Managing employee fringe benefits, insurance, medical, leave records;
8. Performing job analysis; and
9. Supervising employee rating and promotion system.

II. **Finance.** Finance administration takes charge of the accounting, budget and auditing activities of the organization.

1. Accounting. The accounting section has the following functions:

   a. Record-keeping of all expenditures and reports to the management and/or other regulatory authorities. It also supplies all the necessary data for the preparation of the annual budget. It is responsible for examining whether the expenditure is within the approved budget and accepted procedure, and providing researchers and heads of units at all levels with up-to-date information on the state of expenditure in their relative fields of responsibility;

   b. Payment or processing of payments for all goods and services;

   c. Maintaining a timekeeping system and provides payrolling services for staff;

d. Maintaining a detailed accounting system with necessary subsidiary ledgers and other controls to insure the accuracy of all postings and reports; and

e. Doing special reviews and prepares special reports to serve the needs of management.

2. Budget. This section performs the following:

a. Forward planning of all line item budget requirements for the current year as well as projections covering future periods up to 10 years or more;

b. Continual reviews of accounting reports to insure that budget objectives are being attained;

c. Adjusting the budget of projects for the current year and for future years when current projections are inaccurate;

d. Planning to take advantage of lapsed salaries and other budgetary contingencies;

e. Advising the management through its budgetary reports and trends;

f. Matching the drawdown rate of funds to funds that are made available by postponing those categories of expenses for which this is feasible;

g. Careful review of budget requests from all departments; and

h. Insuring that funds are allocated fairly to meet overall needs of all units of the organization.

3. Auditing. The functions of this section area as follows:

a. Performing necessary financial and compliance audit to insure that all operations are within the prescibed plans, goals and objectives;

b. Insuring that reports provided to management are accurate; and

c. Reporting the breaches in internal control, losses or other performance factors that are not in compliance with existing laws, regulations, or normal standards of performance.
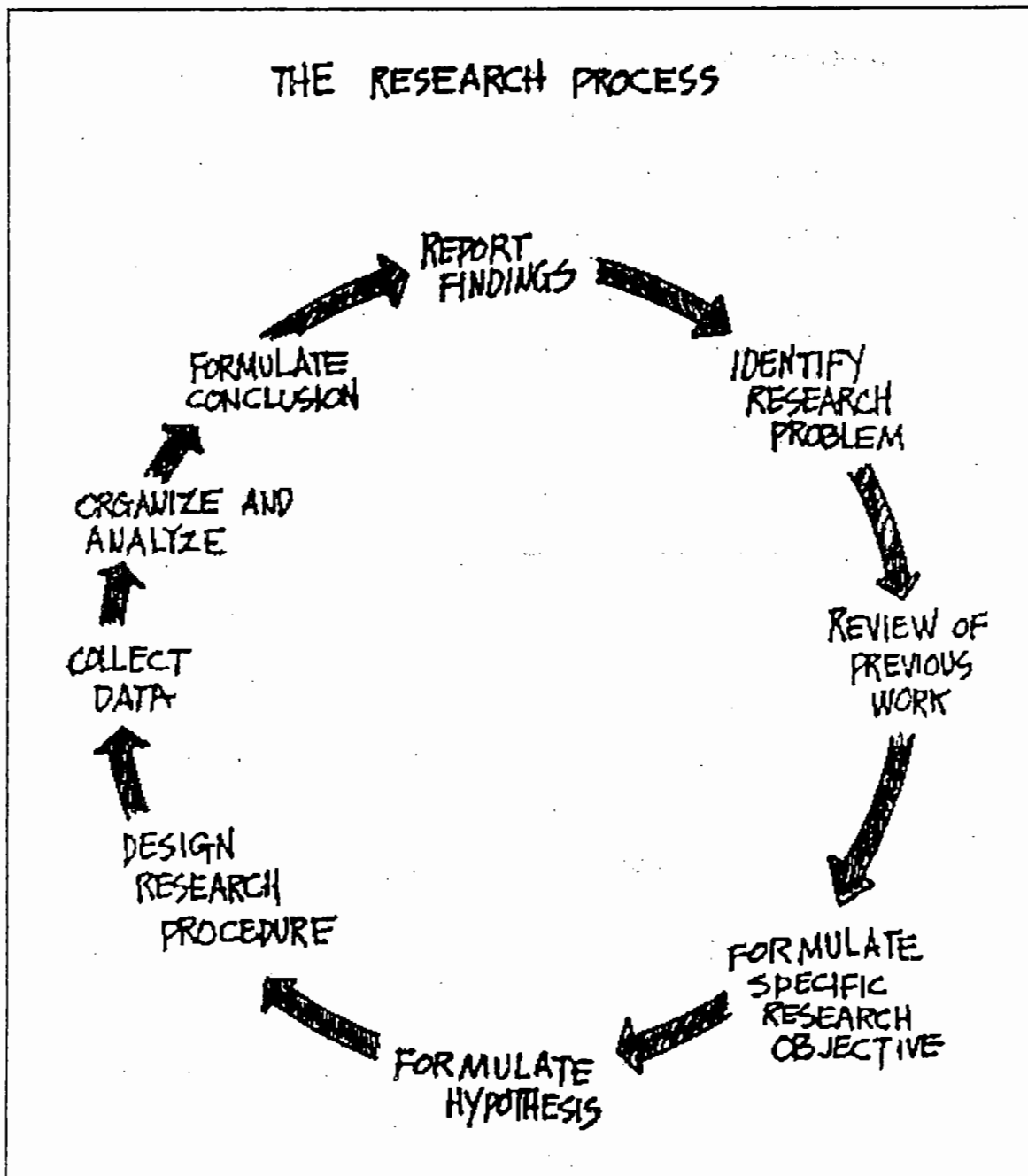
FUNCTIONS OF THE ADMINISTRATIVE SYSTEM

I. **Personnel.** Normally, the personnel office carries out the following functions:

1. Recruiting staff (all the formalities and practical problems concerned with recruiting);
2. Developing basic/minimum professional requirements for filling positions so that no disparity will exist between departments;
3. Coordinating with budget in planning the overall personnel strength by department or unit;
4. Developing job descriptions;
5. Reviewing staffing requirements continuously;
6. Establishing and disseminating to all employees the personnel policies and the rules and regulations of the organization;
7. Managing employee fringe benefits, insurance, medical leave records;
8. Performing job analysis; and
9. Supervising employee rating and promotion system.

II. **Finance.** Finance administration takes charge of the accounting, budget and auditing activities of the organization.

1. Accounting. The accounting section has the following functions:

   a. Record-keeping of all expenditures and reports to the management and/or other regulatory authorities. It also supplies all the necessary data for the preparation of the annual budget. It is responsible for examining whether the expenditure is within the approved budget and accepted procedure, and providing researchers and heads of units at all levels with up-to-date information on the state of expenditure in their relative fields of responsibility;

   b. Payment or processing of payments for all goods and services;

   c. Maintaining a timekeeping system and provides payrolling services for staff;

III. **Purchasing/Procurement and Supplies.** This office does the following:

1. Maintaining supplies that are needed on a day-to-day basis;
2. Keeping inventory of materials. The size of inventory is determined by supply line, cost of item, shelf life, storage capacity and the like;
3. Procuring goods and services. It employs a system of competitive bidding which is based on a system or regulation;
4. Ordering the scientific equipment in close consultation with the research worker involved, and also with other specialists who may be in a position to give advice on the subject; and
5. Receiving and Shipping materials. It inspects, counts and verifies the ordered materials properly dispatched to the requisitioning department.

THE RESEARCH PROCESS

REPORT FINDINGS

IDENTIFY RESEARCH PROBLEM

FORMULATE CONCLUSION

REVIEW OF PREVIOUS WORK

ORGANIZE AND ANALYZE

COLLECT DATA

DESIGN RESEARCH PROCEDURE

FORMULATE SPECIFIC RESEARCH OBJECTIVE

FORMULATE HYPOTHESIS

Message:

The research process is generally common for all disciplines. Initially, the researcher decides on what research area to work on. After reviewing the state-of-the art, the researcher formulates the hypothesis, designs the research procedure, collect data and then formulate conclusions.

UNIQUE CHARACTERISTICS OF THE RESEARCH PROCESS

1. CREATIVITY: Unique solution to a problem

2. UNCERTAINTY: Cannot be determined a priori

3. EMPIRICISM: Use of facts to arrive at conclusions

4. AUTONOMY: Authority and freedom to make certain decisions

5. CONVERGENCE AND COMMUNICATION: Sharing of findings and procedure

6. OBJECTIVE: To discover, predict and explain

THE CREATIVE PROCESS

1.	Immersion or Familiarity:	Knowing more about the prospective subject/problem
2.	Deliberation and Analysis:	Understanding what is going on and why certain things do not work
3.	Incubation or Allowing the Subconscious to Work:	Rest the mind; don't rush; Arrival of solution, allow ideas to combine
4.	Illumination:	Eureka! Bingo! Solution just came at the right moment, inspiration, association, accident, etc.
5.	Verification and Refinement:	Try in practice how a solution, an idea or concept works

```
THE WORLD OF SCIENCE AND MANAGEMENT


        SCIENCE                                 MANAGEMENT

Conservatism          ————————————  Risk Taking
Precision, Exacting   ————————————  "Ball Park" Figure
Accuracy and Completeness  ————— —  Compromise
High Control (Error-free)  ————————  Within Range
Autonomy              ————————————  Regulation/ Standardization
Narrow and Focused Interest  ————   Total System
Specialized           ————————————  Collective Work
Peace and Quiet       ————————————  Conflict/Competition
Uncertain Endstate    ————————————  Predictable Result
Loyalty to Discipline & Peer  ————  Organization-oriented
Positive Feedback     ————————————  Negative Feedback
```

Message:

Switching from science to management and vice-versa is not easy for anybody. The assumptions, expectations and standards of behavior are poles apart.

Scientists by their nature are conservative and slow to react while managers are more action-oriented, entrepreneurial and opportunistic.

```
            SOME ASSUMPTIONS OF SCIENCE


    1.  Nature is Orderly and Regular

    2.  Nature Can Be Understood

    3.  Knowledge Better Than Ignorance

    4.  Cause-Effect Relationship

    5.  Nothing is Self-Evident

    6.  Knowledge is Experience-Based
```
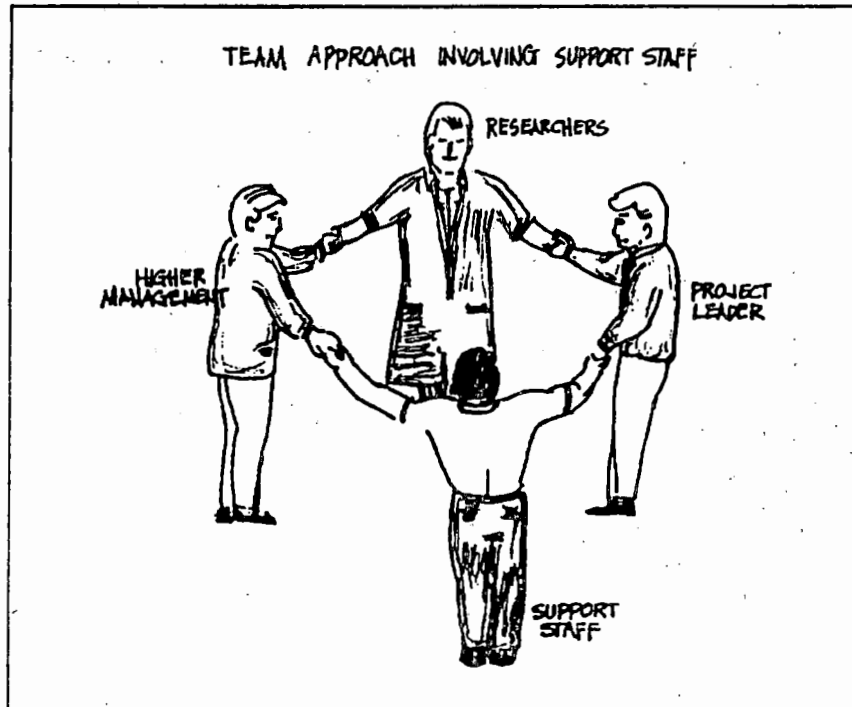
Message :

        The success of a research enterprise is dependent on the collaboration and cooperation of the higher administration, researchers, project leaders and support staff.
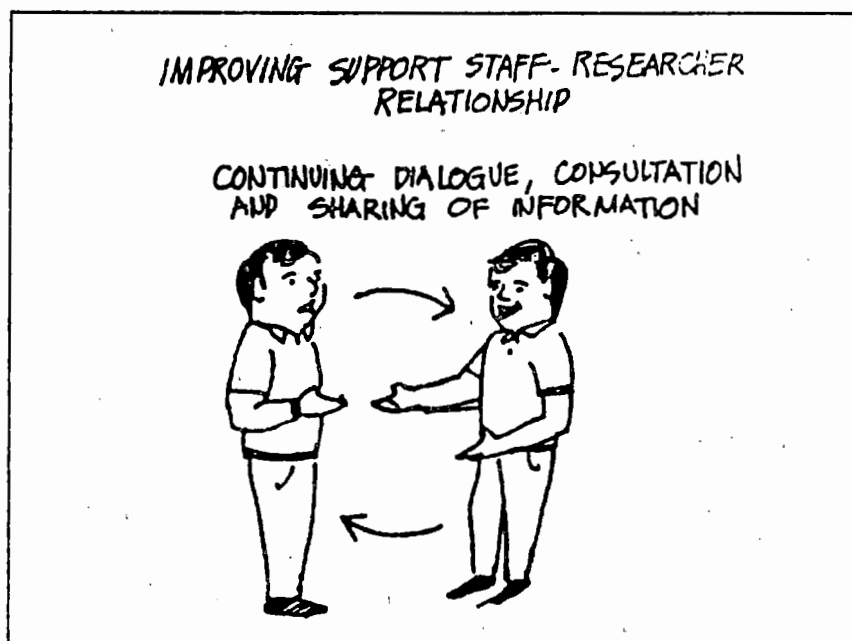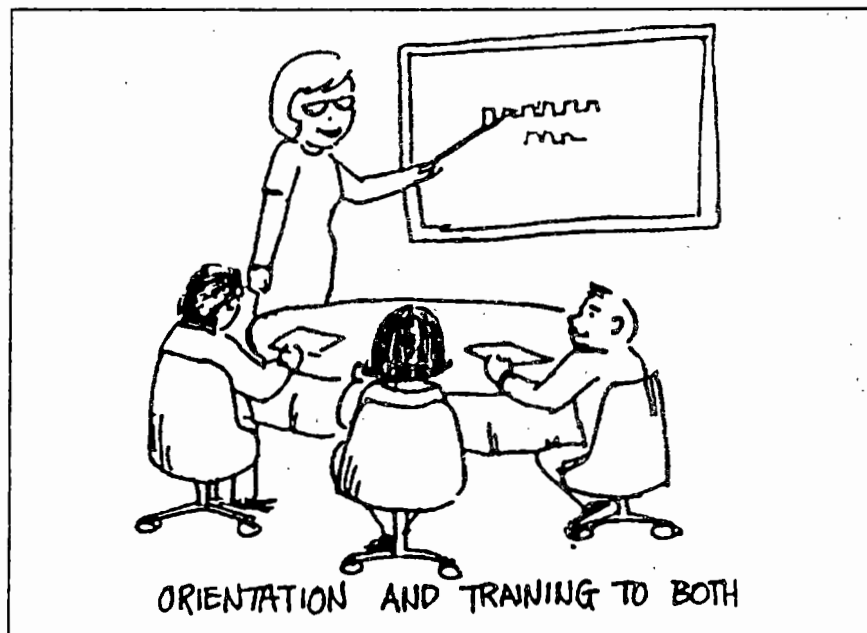

Message:

        Interpersonal communication promotes understanding of the problem and supportive working relationship.

ESTABLISH SYSTEMS AND PROCEDURES

.Message:

Common and repetitive problems need a standard system and procedure of dealing with them for greater efficiency. The research and support staff must jointly participate in the preparation of the standard operating procedure (SOP).
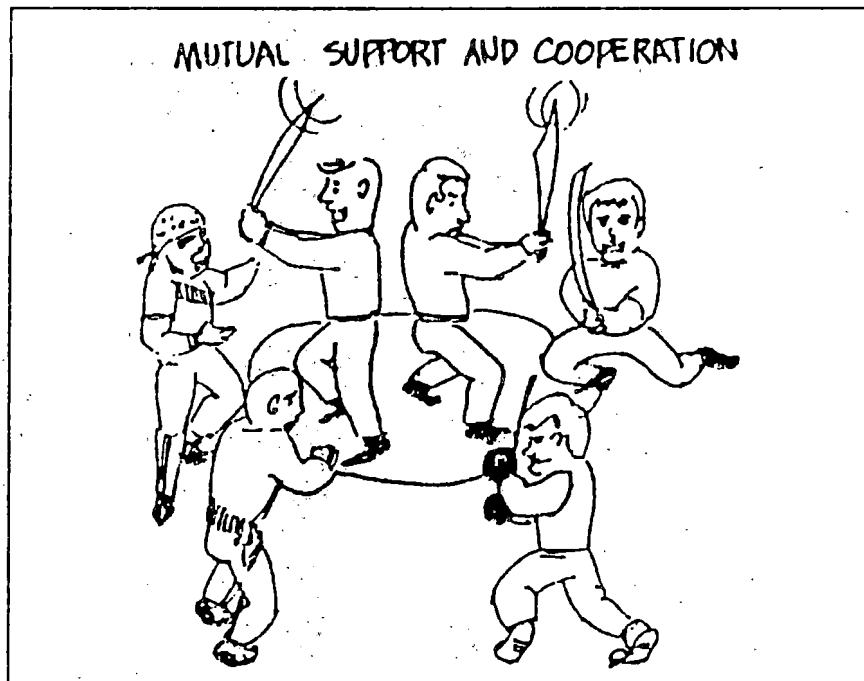

ORIENTATION AND TRAINING TO BOTH

.Message:

Joint attendance in briefings, orientation and trainings lead to immediate feedback and common interpretation.

SHARING OF CREDIT AND ACCOUNTABILITY
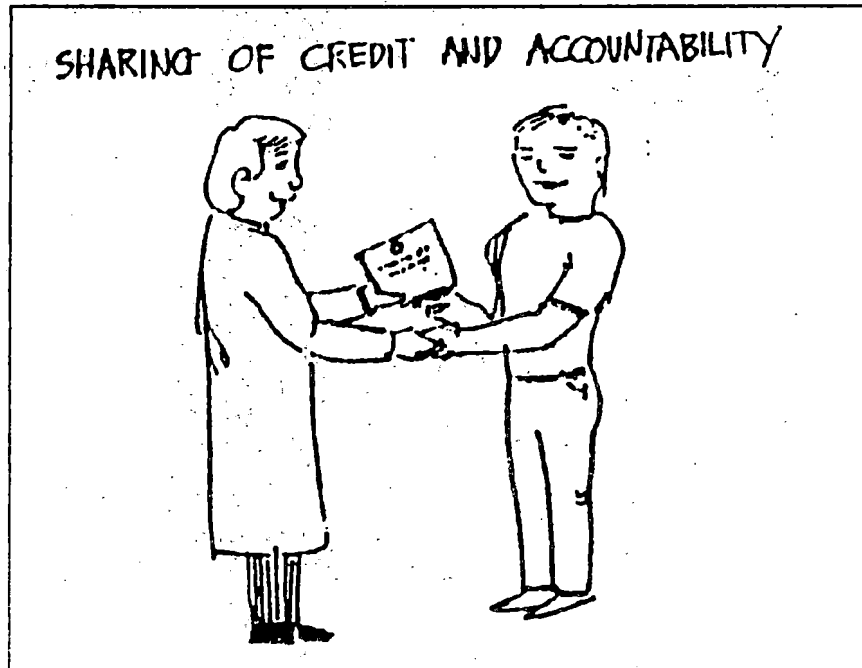
Message:

Mutual benefit to both parties is the key to continuing cooperation.


MUTUAL SUPPORT AND COOPERATION

Message:

No internal and external threats are so insurmountable that mutual support and cooperation between research and support staff cannot overcome.

Interdependence of Research and Support Services/44

Message:

Among professionals who each have their respective line of specialization, mutual trust and respect will lead to mutual goal attainment.
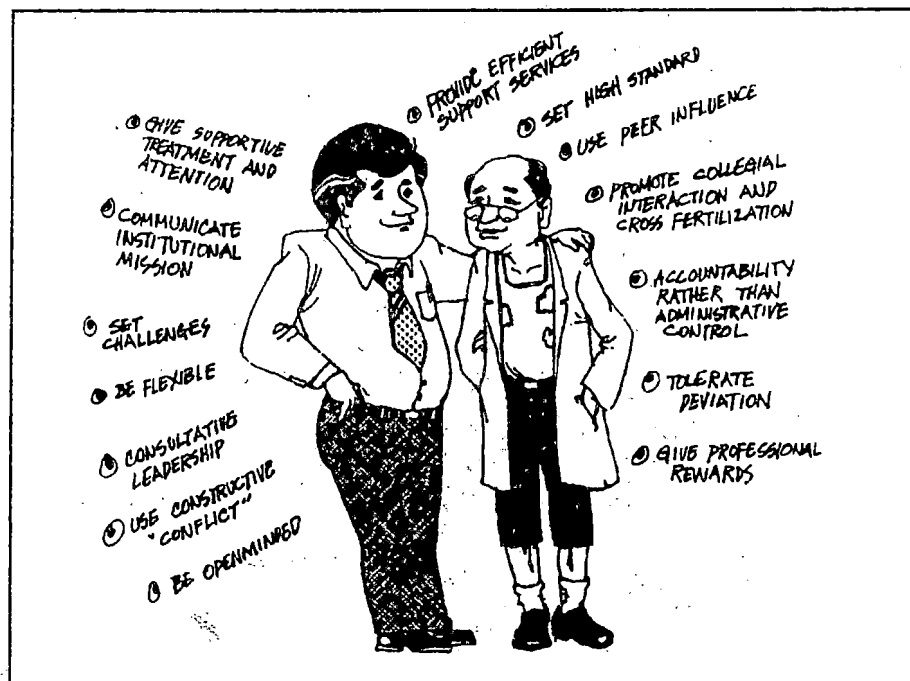
Message:

In research, the basic process that is being managed is creative energy and technical capability. Researchers, like any human beings, respond to proper treatment from higher authorities.

RESEARCH SUPPORT PERSONNEL

FINANCE

Budget
Accounting
Internal Audit
Cash

LOGISTICS

Purchasing
Stock Management

PHYSICAL PLANT

Building Repair
& Maintenance
Grounds Maintenance

MOTOR POOL

Repair and Maintenance of
Motor Vehicles
Dispatching

TRAVEL

Booking
Travel Documents

EXPERIMENTAL FIELDS

Plot Preparation
Field & Facilities Maintenance
& Improvement

CONFERENCES

PERSONNEL

Recruitment and Hiring
Staff Development
Welfare of Employees
Performance Evaluation
Personnel Files
Grievances

TECHNICAL

Analytical
Statistical & Data
Managemnent
Editing
Library

ACCOMODATION AND
FOOD

Dormitory
Hostel
Cafeteria

EXTRAMURALS

Public Information
Public Relations
Extension & Training

SELF-EVALUATION

Instructions:

To get the most out of this exercise, it is suggested that you first complete the test before comparing your choices with the suggested correct answers. Answers are provided at the end of this section.

Put a check mark before the statement(s) that are true for the most part.

1. In a research organization, the units for finance, personnel, grounds and buildings, library and purchasing are in fact supportive of the main business of research.

2. Researchers by their very nature are self-centered.

3. Those in support services are also professionals and therefore should be respected.

4. Bureaucrats tend to be fault finders.

5. To make the researchers develop humility, they have to be given a run around treatment to teach them a lesson.

6. For standardization and greater efficiency, there should be no different accounting and auditing system for research.

7. Researchers should be given preferential treatment than support personnel because support personnel need them more than vice versa.

8. Common and mutual benefit helps improve working relationship between researchers and support personnel.

9. Researchers and support personnel belong to two contrasting/conflicting cultures.

10. Purchasing and accounting people need not be involved in the planning process of reseach for afterall the subject matter is too technical for them to follow. They will be more productive if they concentrate in their work.

Answers: 1, 2, 3, 4, 8, 9

Cover Design: Toti Laforteza
Illustrations: Nonoy Alegre

The whole idea of the series "Research Management Learning Packages" is visualized by the flame, the line graph, the grid and the base.

The **flame** symbolizes success in scientific research indicated by outputs in terms of information, knowledge and technology which come out in different stages (dark and light shades).

The **line graph** that is progressively pointing up, visualizes the goal of research management - the ever increasing performance of the researchers and the collective system.

The **grid** symbolizes the division of labor and level of responsibilities in the research organization. The open lines of the grid represent the system's relationships with the environment.

The **base** symbolizes the organizational structure and management system. It is responsible for coordinating, processing environmental inputs and developing programs and strategies.