MANAGEMENT MANUAL FOR

PRODUCTIVE R&D INSTITUTE-CONSTITUENCY RELATIONSHIP

ICIPE

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FAMESA

ICIPE

FOREWORD

In the context of national development goals, research and development (R&D), as a tool of science and technology, is considered productive if the activity can be used, or if its output is harnessed in solving national development problems, whether directly or indirectly. The implication of this is that R&D must be targeted to specific groups or individuals whose actions contribute to the socio-economic growth of nations and, therefore, would find the generated technology as a result of R&D programmes of some use in their endeavours.

What is crucial in the R&D process is, therefore, the beneficiary, or the final user (e.g. farmer, industrialist, etc), for whom there is a kind of 'custom-made' output. In this **Manual**, the emphasis is on methodologies for determining user needs, which underscores effective communication with the final user, as a necessary condition for effective and productive R&D. The **Manual** stresses that no single method provides a panacea for resolving the woes of RDIs on interaction with final users; consequently, each RDI has to establish its own strategies, given its particular limitations. One of the glaring examples used in ensuring relevance for agricultural R&D for the final user is found in farming systems research (FSR), where the farmer is directly involved in the research process. This latter approach of involving users in the R&D programme is possible in applied research and product development as in industry, but may not be applicable in the sophisticated confines of an RDI laboratory; furthermore, it is not an effective mechanism for transfer of technology for all potential users.

Because an R&D output will not reach all groups within the constituency of users, a vigorous effort of marketing and commercialisation has to be undertaken to ensure acceptance and usage of a product, process or service within the constituency. The RDI can partially achieve the process at the level of the needs identification and assessment of ICIPE, but the larger task of commercialisation may demand the involvement of government departments charged with extension in the case of national RDIs. The **Manual** recommends efforts both at institutional and national levels.

In a recent FAMESA survey, representatives of national RDIs expressed the need for training in the area of patents as a form of industrial property. In Chapter IX of this **Manual**, the patent system is discussed from the context of incentives to a researcher, under the general theme of intellectual property rights. It behoves R&D managers to ensure that an operational policy is formulated on how to handle development-oriented discoveries and technological inventions made by scientists. In the same Chapter, guidelines on how RDIs may formulate policies on patents is given. It is our hope that RDIs will use these guidelines in understanding the patent system in their own RDI purview, or be able to adapt these for their own use.

This **Manual** has been developed and validated by regional experts in R&D management, basically to stimulate thinking in an area which has been neglected, yet

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10th October, 1988

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INTRODUCTION

Training Objectives

By the end of this section, the participants will be able to:

1.   Explain the need for R&D management training

2.   Outline the purpose and contents of the **Manual**

3.   Describe the **Manual** format, and the variety of ways in which it may be used for training purposes

4.   Adapt the **Manual** for their optimum mode of study and learning

MANAGEMENT MANUAL FOR PRODUCTIVE R&D: R&D INSTITUTE CONSTITUENCY RELATIONSHIP

INTRODUCTION

INTRODUCTION

Contents

All of this material can be covered in one session, if it has been studied on an individual basis prior to the session.

INTRODUCTION

1. Need for Management Training

Introduction: This **Manual** is based on solid research experience by FAMESA on the management of RDIs in Eastern and Southern Africa and other developing countries. It represents a unique training experience. Needless to say, this Series III **Management Manual for Productive R&D: R&D Institute Constituency Relationship** will be adapted and revised by users to make it most applicable within each national system. But hopefully, the basic design will prove sufficiently effective to justify the development and publication of companion volumes covering the full range of RDI management topics. Furthermore, it is hoped this **Manual** will stimulate sufficient reaction to encourage both local and international sponsors to join in this R&D management training venture.

Observations on the Relationship between RDIs and their Constituencies: The efficient and effective transfer of scientific knowledge and technologies from the RDIs to their beneficiaries or final users constitute the ultimate aim of any R&D effort. Consequently, RDIs have to continually seek ways and means to strengthen their medium for this transfer. This challenge can be fulfilled through the identification of the diverse potential beneficiaries of any R&D ventures, the identification of their needs, and the means by which these needs may be fulfilled.

This **Manual** on **R&D Institute-Constituency Relationship** is based on observations made in several RDIs in Eastern and Southern Africa, and extensive discussions with several R&D managers in workshop sessions. Through many of these fora, FAMESA identified considerable shortcomings in the way, RDIs relate to their various constituencies. It is therefore the purpose of FAMESA to assist, through this **Manual**, on the possible means to apply so as to resolve these problems.

Consultancies, training sessions and exercises led to four fundamental observations which had the greatest influence on this **Manual** approach to the subject of R&D institute constituency relationship:

1. Awareness within RDIs has to be improved to enable all from policy and strategic levels to operatives within the RDIs — to understand the role of RDIs should play toward national development. This will ensure unity of purpose among RDI personnel.

2. The contribution of the RDI, whether qualitative or quantitative, must be oriented toward a defined target or clientele; this is a way to ensure appropriateness and relevance of the R&D efforts.

3. The R&D enterprise requires vigorous marketing of the R&D output to ensure its acceptability and adoption.

4. Given Africa's plight in the last decade marked by hyperinflation, huge external debt repayments and a crippling food crisis, the role of R&D as a tool to increase national productivity is more paramount. It is, therefore, very likely that national policies will recommend increased investment in R&D ventures; and this will necessitate a concomittant increase in accountability of the RDIs to the public for this investment.

Many RDI managers graduate to management positions from the ranks of technical specialists in charge of R&D projects. On the face of it, this would suggest that they are particularly responsive to the needs of R&D project leaders — and in fairness, we must conclude that some are. However, deficiencies in management experience and training often preclude their effectiveness in responding to these needs.

This **Manual** constitutes Series III on the FAMESA theme **Management for Productive R&D**; the first dealt with management techniques in planning and budgeting in the context of management as a tool for improving R&D productivity and was entitled *Strategic and Project Planning and Budgeting*. The **Manual** on Series II deals with an overview of R&D facilities and materials management and relates its particular skill to the whole management process. This **Manual** uses a similar approach though it does not address specific management skills.

Pedagogical Considerations: Part of the uniqueness of this R&D management training venture lies in the pedagogical standards adopted for each **Manual**. They derive from experiences in designing, writing and delivering long and short term training to R&D managers in developing economies — as well as familiarity, with training materials developed by others in this business. Five particular standards have been applied to the development of this **Manual**.

1. **Mediated and Self-Instructional:** The **Manual** must be amenable to stand-up delivery by skilled trainers. But, it must also be amenable to self-instruction.

2. **Experiential:** The **Manual** must provide motivation and opportunity for trainees to practice key management technologies by solving realistic training problems and exercises.

3. **Visual:** The **Manual** must provide visual stimuli for both mediated and self-instructional modes of delivery.

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4.   **Interactive**: The **Manual** must stimulate, structure and process mutual problem solving discussions, not only between trainees and instructors, but among trainees themselves.

5.   **Empirical**: The ideas and concepts introduced by the **Manual** must be selected on the basis of real observations about management practices and problems in Third World RDIs. Further, they must be presented in the same terms.

The first criterion, **mediated and self-instructional**, derives from the feeling that needs for training in R&D management are widespread. Therefore, it is wasteful to develop materials which are only meaningful and available to a few R&D managers, fortunate enough to be selected for a workshop.

Further, few materials developed for past courses and workshops are practical for review purposes by workshop participants — much less practical for participants to share with colleagues who could not participate in the training. We desire to overcome these limitations with the **Management Manuals for Productive R&D.**

The fourth criterion, interactive, stems from a sense that RDI participants fail to see the value of sharing their management problems and jointly seeking solutions to them — either between RDIs within countries, or between countries. Of course, there is the sectoral bias — that is, their feeling that a manager from an RDI in one sector (like agriculture) has nothing to offer a manager from an RDI in another sector (like industry). There is also a socio-cultural bias which inhibits managers of one culture from sharing with, and learning from, managers from another.

It is therefore, important for the **Manual** to demonstrate that all trainees have a great deal to offer each other. It must, therefore, stimulate them to share and solve their management problems together. One of the greatest long-range impacts of this **Manual**, and its companions, would be the generation of a worldwide network of R&D managers who actively seek each others' ideas and solutions to management problems.

The fifth pedagogical criterion, **empirical**, stems from the feeling that attempts to transfer management technology from business schools, or RDIs, in industrialised countries, to RDI managers in developing countries is ineffectual — if not inappropriate, unfair and insensitive. Many management techniques developed in Europe or the United States simply do not apply in that context. Therefore, the **Manuals** must present management in the context of real RDI problems and opportunities.

We have adopted two strategies for accomplishing this. On the one hand, the **Manual** requires participants to apply the concepts to their own RDI problems. All participants in training with these **Manuals** are encouraged to bring for these purposes:

1.   Their country's current development plan.

2.   Current statements of their country's science and technology policies.

3.   The mandate statement for the institution they represent.

4.   The current organisation chart for their own institution

5.   Examples, from their own institution, of R&D proposals, budgets and final
       reports.

Many of the exercises in the **Manual** call for the participants to apply management
principles to their own R&D institutions. These documents will greatly enhance the
value of these exercises and the transfer of sound R&D management principles to real
R&D settings.

The second approach to the requirement that R&D management training be based on
the real needs, priorities and pressures experienced by RDIs is fulfilled through the
process used to develop the **Manual**. R&D managers contribute papers on their real life
experience which outline the parameters of this **Manual**. Further, they integrated their
observations in the body of the text so that trainees can see how the management
concepts relate to real experiences. Finally, the whole **Manual** was critically reviewed
and evaluated by a team of 15 R&D and management specialists from eight countries in
the FAMESA subregion. Their work led to a major revision of the core curriculum.

Partners in R&D Management Training: If these strategies are successful, we expect
demand to increase for RDI management training provided by instructors who are
trained to use these **Manuals**. Further, we expect demand for use of them in the self-
instructional format. It is likely, that RDIs will also organise their own training
programmes, using the **Manual** as a basis for instruction. In other words, the
opportunity exists, through a mechanism like this, for the R&D managers of the world
to become partners in an effort to make dramatic improvements in the conduct, and
ultimately, of R&D on national development.

2. Purposes of the Manual

This **Manual** focuses on R&D management experiences which will improve the
relationship between RDIs and their clients. It is targeted on R&D managers at both the
strategic and operational levels of the RDI.

Therefore, it will be helpful to a wide variety of R&D managers. In fact, we would
encourage its use in workshops comprised of participants from diverse, (1) sectors of
the economy, (2) levels of technical sophistication, (3) management experience, (4)
career status, and (5) R&D roles and responsibilities.

The **Manual** is designed to help managers:

1.   Understand how to identify their constituency and their needs
2.   Comprehend the need for establishing good relationship with clients
3.   Develop strategies for marketing and commercialising their R&D outputs.
4.   Learn concepts and skills, and to apply them to their own systems.

For these purposes, the **Manual** is divided into eleven parts, as follows:

INTRODUCTION

CHAPTER 1:   **R&D Management**

CHAPTER II: **Determining Research and Development Institute (RDI) Constituency**

CHAPTER III: **Assessment of RDI Client Needs**

CHAPTER IV: **Marketing of R&D Output as an Aspect of Constituency Relationship**

CHAPTER V: **The Consequence of an RDI Neglecting its Constituency**

CHAPTER VI: **R&D Institute Extension Services**

CHAPTER VII: **Why an Information System?**

CHAPTER VIII: **Notes on Basics of Contractual Agreements and Legal Requirements from Clients**

CHAPTER IX: **Protection of R&D Innovations: The Patent and Licensing Systems**

CHAPTER X: **Exercise on RDI Social Accountability**

GLOSSARY

Each Chapter is headed by a content outline and learning objectives. They will be useful for instructors who are planning the agenda for a programme of instruction. This is a stand-alone, self-instructional package with an inherent motivated sequence which should both stimulate and control the pace and quality of learning. Further, it is designed for easy adaptation to mediated instruction in a workshop setting.

So much for an introduction to the purposes and approaches of this **Manual,** the last section of this Chapter is directed to the user of the **Manual**. It explains the design, format and application of this training material. It starts below.

3. Instructions for Users

Introduction: Welcome to the Management **Manual** for Productive R&D. We hope that it will enhance your R&D management skills, and be a pleasant learning experience.

Individual and Group Learning: The **Manual** is designed for either individual or group learning. It is self-instructional for the R&D manager who is studying independently. But it is also amenable to group learning; for use in workshops and

other training contexts. It may be used by a manager participating in a large workshop, and then re-used as that manager shares it with a colleague back in the office. It was designed to make the most learning possible in the greatest variety of formats.

Exercises: Each Chapter contains exercises which help the R&D manager practice the ideas and concepts being discussed. These exercises may be conducted in a variety of ways: individually in the self-instructional mode; overnight as homework during a mediated workshop; in teams during class time; or even in plenary.

Instructor(s) Notes: Occasionally there are notes to the Instructor(s), designed to help them plan and deliver a workshop, in the mediated mode. If the **Manual** is being used in the self-instructional mode, these may, and should, be ignored. Otherwise Instructor(s) may find them helpful in organising the workshop.

Chapter Guides: Each section is headed by some coloured pages. These give information which will help you plan your study. The first one is simply a title page. The second, however, presents the learning objectives for all the information contained in the Chapter.

The third coloured page is a Table of Contents for the Chapter. It is like any other Table of Contents, except that it includes notice of a — **Session Break** — wherever we think it would be helpful to divide the material into successive days of workshop sessions. It also shows the index numbers assigned to principal paragraphs in each Chapter. These numbers are designed to help you direct your study and discussions with other fellow-students.

Length of Sessions: A workshop planned for a group of R&D managers should include about 5 days of instruction.

Basically, we encourage half-day sessions during which new material is introduced. It usually works best to introduce new material in the morning. Then the afternoon is a good time for group exercises and field trips. This takes advantage of the participants' natural tendencies to be more alert and rested in the morning. Regardless, we encourage such workshops to include many frequent and diverse field trips and visits to RDIs so that learning includes as much experience and novelty as possible.

Also instructor(s) should mix as many methods of instruction and exercises as possible in order to maintain the interest of participants. Each of the exercises in the **Manual** may be adapted to a variety of techniques. It is up to the instructor(s) and participants to select those which are most useful, and instructional.

Above all, this learning experience should be enjoyable. It can be made by adapting the **Manual** to the needs and learning habits of the R&D managers who look to it for guidance. The **Manual** was designed with flexibility in mind. We encourage R&D managers and instructor(s), alike, to adapt it to their own needs and interests.

Two column Format: If you thumbed through the **Manual**, you probably noticed that it is produced in a two-column format. Furthermore, the typing format changed between columns. Here is why.

The left column provides the text for the programme of study. For an instructor it serves as the basis for lecture and discussion material.

For the R&D Manager, it serves as the basic content for self-instruction or workshop preparation.

The right column, on the other hand, is where we relax a little bit and introduce some of the fun and flexibility in use of the **Manual**.

Your Notes: Here you can add your own thoughts, comments, questions and notes as you read, listen to a lecture or participate in a discussion. You are encouraged to write right on the page. That way your thoughts remain with the textual material; and the combination becomes a more powerful learning tool.

Our Notes: But you will also find our notes here. They take many forms. Some of them are questions which we would like to ask you to answer. They serve the purpose of providing a review of the textual material. If you can answer all these questions satisfactorily, then you probably have a good grasp of the material in the chapter.

These questions are also helpful to the instructor(s) who can use them as a basis for classroom discussion; they can even be used to develop small group, team, exercises.

Each question is located next to the textual paragraphs (in the left column) which provide a basis for answering them. So if you have difficulty with them, you will have no trouble finding out where to go for help.

Above all else, we want all participants to re-orient all of their management ideas, and practices, to actually achieve useful R&D results — what we are calling "productive R&D". Therefore, we use the boldface type to emphasise summary statements about productive R&D.

Citations: You will find citations at the end of each Chapter. These are the sources which had the most direct impact on the development of material contained in the respective Chapters. All citations in the **Manual** are made in a modified Turabian style. Modifications in the format were made to simplify interpretation and abbreviate space requirements.

If this particular format is unfamiliar to participants, we encourage flexibility and diligence. It was not possible to select a format which is known by all possible audiences. Turabian was picked as the basic format because of its simplicity

"Cases": The right column also contains descriptions of real RDI experiences which characterise what we are talking about in the text.

We call them "cases" because they represent real situations. However, we use the word advisedly because these are really too short and undeveloped to represent cases in the strictest sense of the word. They are included to add a flavour of reality to what we are discussing in the text.

Emphases: We also use the right column to emphasise key points. Sometimes we do it by making a comment. Other times we may do it with a simple diagram. But do pay attention; those notes in the right column — our notes and your notes — are like a traffic signal. They direct your travel through this course of instruction; and they regulate your learning.

Definitions: As with any new material, you will undoubtedly run into new words. Many of them are important for you to learn because they are part of the special language of R&D management. We try to emphasise them in a couple of ways.

The second topic of each Chapter in the **Manual** presents new definitions. But, we also print these words in boldface type the first time they appear in the text. That should draw your attention to them. Then, their definitions are usually underscored. Finally, we have included a **Glossary** which will also help you adjust to the language.

Boldface Text: We also use the boldface text to emphasise one key idea throughout this **Manual.** If nothing else, we sincerely hope that all participants exit this course of instruction with renewed appreciation for the role of R&D in national development.

CHAPTER I
R&D MANAGEMENT

R&D MANAGEMENT

Training Objectives

By the end of this section, the participants will be able to:

1. Define R&D management

2. Explain the seven elements of R&D management

3. Distinguish three elements of the RDI management system and tell how they relate to each other functionally

4. Identify and differentiate three kinds of R&D Managers

5. Explain the role of decision-making in R&D management

6. List and define a dozen topics that comprise an R&D management curriculum

R&D Management

Contents

All of this material can be covered in one session, if it has been studied on an individual basis prior to the session.

CHAPTER I

R&D MANAGEMENT

Good management practices are imperative for the success of any venture, especially to increase the effectiveness of available resources in an era of shrinking resources and insufficient attention to management concepts have proved to be a major factor in the unsuccessful outcome in many of the development endeavours of Third World countries. This is particularly true in activities relating to science and technology for development (*Shihab-Eldin*).

1.111   **Introduction**: Management refers to effective and efficient mobilisation of resources aimed at achieving predetermined goals or objectives. A manager is someone who gets things done. He organises and manages resources to produce results. He is the primary decision maker in an institution. There are different levels of managers. Their functions place them in a pyramid structure: top decision makers at the top, operative managers at the bottom and intermediate decision makers in the middle.

1.112   The manager operates under various external and internal enviroments. The external environment comprises, political, systems. The internal environment refers to physical, financial, human, material and information resources. Both environments influence and affect the dimensions of management.

1.113   The general management functions include:

*   Planning: to facilitate the accomplishments of institutional objectives. Planning must precede the execution of all managerial functions.

*   Structural Organisation: the structure of roles, and shaping of activities, necessary to attain objectives, assignment of authority and structural provision for coordination. Structural organisation clarifies responsibilities and removes confusion and uncertainity of assignments.

*   Staffing: the functions of staffing and leading are concerned with human resource i.e. the number and kinds of people. It implies recruitment, selection, placement and promotion as well as appraisal, training and development.

*   Controlling: this management function refers to measurement and correction of the performance of activities of surbonidates to ensure successful accomplishment of plans and objectives of the institution.

*   Directing/Leading: this management function is concerned with interpersonal relations of managers and non-managers - giving guidance and direction for satisfactory performance of the institution.

*   Coordinating: management function for the achievement of harmony of individual efforts towards the accomplishment of corrective goals.

1.114   A manager is expected to have some *general* management skills. These include:

*   Leadership,
*   communication,
*   supervisory,
*   analytical,
*   accounting and
*   ability to relate to others.

What common leadership styles exist among Managers? What are their advantages and disadvantages? Cite some analytical skills and when are they needed?

1.115   For a manager to be successful he should be equiped with management tools. The most basic of these are the budget, plans, statement, reports and data processing systems. These tools facilitate decision making both at the strategic management level where strategic management decisions are made and at the tactical management decision making level to effect ways and means of achieving things.

1.116   R&D management uses the foundations of the general management principles but remains one of the least developed, but most essential,capabilities in the R&D enterprise. Most professionals approach R&D with advancedtraining and experience in the subtleties of science and technology. Most of them are able to conduct very sophisticated studies.

1.117   But what happens when a group of them are brought together with the expectation that their team efforts will exceed what they could accomplish individually? What happens when they all become dependent on resources emanating from a single administrative superstructure?

What happens when that superstructure not only controls resources for their work, but also their technical goals and priorities? In sum, what happens when scientists and technologists who were trained, for the most part to work individually, are organised into an enterprise of which is expected corporate productivity and resource accountability?

1.118   That is the point at which the scientific pursuit of technology obtains a character which many researchers find totally unacceptable. Others, who recognise the importance of organised-science for national development, spend the largest portion of their careers adapting to it. Some of them even accept the challenge of leaving their laboratories, micrometer screws, vials and other scientific instrument, for the typewriters, telephones, memoranda, financial reports and swivel chairs of R&D management.

1.119   It remains for these few to develop the technology of R&D management. Few universities around the world offer such coursework. And few programmes in business schools are directly applicable to the unique character of management problems in R&D. So we are here to share our successful R&D management practices.

Think and list other ways in which the management tools may be effectively used.

How many trained researchers, and technical assistants work in RDI? How many of them were trained especially to work with a team of researchers on interdisciplinary projects? In contrast, how many of them were trained to work relatively independently on research projects of their own design and interest?

How many of them were given some training?

On the other hand, how many managers in your RDI, were once (or maybe still are) researchers?

How well have they adapted to the reports management role?

Take a moment to rapidly list as many "R&D management" tasks as you can — right here, on these lines.

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1.211   **Definition**: "R&D management": what does it mean to you? Telling research scientists what to do? Maybe hiring them in the first place? Making decisions about the purchase of scientific equipment and supplies? Publishing the results of R&D projects? Winning a commendation from the government for R&D contributions to national development?

1.212   Who should be responsible for evaluating the quality of R&D project proposals — and selecting those which will be funded by the RDI? Who should monitor the technical performance of each RDI project — and nudge someone when those projects deviate from planned schedules or costs? Who should discover the country's highest priority needs for technical solutions to development problems — and incorporate the potential users of R&D solutions into the research management process?

1.213   R&D management is all of these things and more. R&D managers are all people in the RDI — not only the small cadre whose job descriptions include more management functions than scientific or technical ones. For the purposes of this session, and all others in the **Management Manual for Productive R&D** series, we define **R&D Management** as:

What is the difference between "R&D tasks" and "R&D management tasks"?

> The efficient and effective mobilisation, allocation and control of human, material and financial resources in a manner which perpetuates a creative environment in which research and development activities may be used to focus technology on priority nationaldevelopment problems

1.214   This definition has seven significant elements. Each of them deserves special consideration. The seven elements are:

"... efficient and effective ..."

"...mobilization, allocation and control..."

"...human, material and financial resources ..."

"...perpetuates a creative environment..."

"...research and development activities..."

"...focus on technology..."

"...priority national development problems."

Let's dissect each of these elements so that we all commence this study with a common understanding of our principal subject.

1.215a **Efficiency and Effectiveness:** These are very common words in the management lexicon. Efficiency usually implies both speed of execution and parsimony in the expenditure of money and other resources.

When is some process "efficient"? How can you tell?

1.215b It is not difficult to comprehend the meaning of"efficiency"when it is applied to the management of such standard operations as manufacturing. But it acquires increased significance when applied to the field of R&D

What are the special characteristics of efficiency?

Can R&D work be done efficiently? How?

1.215c This is because both time and resource limitations are traditionally considered the enemies of scientific and technological pursuits Some of the greatest scientific and technological contributions to human kind have absorbed largely uncontrolled quantities of resources over time periods which were determined only by the nature of the research, the scientific capabilities of the researchers, and technical progress.

1.215d It was the Second World War which really brought efficiency into the technical laboratory as one criterion for success. Of course scientists and researchers then were applying their expertise to the preservation of basic human value and a style of life for which they were willing to give up life.

1.215e Quite obviously time and resources became critical elements of the R&D management process. They were made manifest in the development of an R&D management technology called "operations research."

1.215f Since then, the number of scientific and technical contributions to life on Planet Earth have increased geometrically — and the rate of growth continues to escalate. But resources are, at the same time, becoming scarcer — hence even greater pressure for efficiency in R&D.

1.215g "Effectiveness" is also widely understood. It usually means that a person, thing, or process actually accomplishes intended results. But like "efficiency" effectiveness has special significance in the field of R&D. This is because, the traditional bastions of research, universities and other scientific centres, frequently placed greater importance on research methodologies than on research results.

When is some process "effective"? How can you tell?

What are the special characteristics of effectiveness?

1.215h But those priorities change in R&D work where the emphasis is on applied research. In an RDI researchers are working to solve real problems of society. They use scientific and research methodologies — as do university researchers. But their purpose is to effectively enhance national development. Therefore effectiveness becomes a very important criterion for the conduct of work in an RDI.

Can R&D work be done effectively? How?

1.215i We wish to emphasise the importance of the concept of R&D effectiveness. The theme of this management training is "Productive R&D". That means, R&D which actually enhances national development. All of the management concepts and processes discussed in this **Manual** stress managing the R&D enterprise so that priority national development problems are solved. Very few RDIs are, or should be, in the business of generating research results for their own sake.

1.216a **Mobilization, Allocation and Control:** These, too, are standard management processes. "Mobilizing" means obtaining, or acquiring; and it refers specifically to all those resources which are needed to conduct useful R&D.

List some of the resources you have to "mobilise", in the RDI:

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1.216b Mobilizing is a special talent. Frequently, it requires an R&D manager's ability to befriend and persuade senior government officials of the importance of the R&D enterprise. In fact, many researchers who accede to management positions are frequently startled to discover the responsibility for obtaining financial resources entails a great deal of personal, representational activity.

Does everyone in the RDI have to mobilise resources? Explain!

1.216c These can include the ability to write effective letters and give persuasive speeches; to explain research to non-researchers; and to compete effectively with other government heads who also seek funding for activities which are totally unrelated to R&D enterprise.

1.216d "Allocation", on the other hand, is what happens to those resources after they are acquired from government or other sources. Allocation is the process of deciding how those resources should be spent, i.e., for which R&D projects, and in what proportions.

What resources do you allocate? List them here:

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1.216e Obviously, since resources are always limited, not all proposed R&D projects can be funded in any given year. Therefore, R&D manager must decide how to distribute the limited resources among the proposed projects. This is accomplished, in part, through evaluation of the merits of proposed projects.It is also, in part, a function of astute project planning. For example, a project which is carefully phased over a couple of years requires less per year funding than it would were it proposed for execution in one year.

Does everyone in the RDI have to allocate some resources? Explain!

1.216f Allocation is management decision making in its purist sense. It requires the capabilities of astute evaluation, sensitive negotiation, clear communication and decisiveness. Quite obviously too, there is a large element of risk in it. What if the project which received the allocation, failed miserably? That is highly likely in the R&D business. R&D is nothing if it is not uncertain in many respects. But that uncertainty does not mitigate the importance of management. On the contrary, it reinforces the value of making tough decisions — like those associated with resource allocation.

1.216g "Control" is a term which strikes fear in the hearts of many researchers. This is because it implies significant restraint on the creative processes which underpin R&D. Yet, it is required in R&D management because of severe resource limitations.

What do we mean by "control"?

How does the concept of control relate to resources for R&D?

Why is control such a difficult concept for some R&D technical people to fully appreciate when it is applied to R&D management?

After all, they have little difficulty with the concept of control when it is applied to laboratory experimentation!

1.216h After resources are allocated to R&D projects, their rate of absorption must be monitored in comparison to the technical productivity of the project. If, for example, the rate of absorption exceeds expectations, then perhaps completion of the project is in jeopardy. It is far better to know that before the project reaches a resource crisis; because it may be possible to bring more resources to bear if the outcomes of the project merit it.

1.216i Control is the process of deciding how to change the rate of resource absorption or technical work, in order to obtain the greatest project efficiency and effectiveness. Quite obviously, it can involve some very sophisticated management techniques. But even more important is the interpersonal sensitivity with

which management control is exerted on the project and the people who are responsible for it. Too much control, poorly conceived and delivered, can inhibit the creative spirit of the best R&D people. It can have an effect on institute productivity which is opposite to that which is desired.

1.216j   On the other hand, lack of control in an RDI can lead to a total breakdown of technical and management discipline — hence R&D productivity. Management control of R&D requires a very sensitive, if firm, hand on all activities in the RDI. It is a function which all RDI personnel must be prepared to exercise, in their own domain; at their own level.

1.217a   **Resources**: Resources represent the "cost" of productive R&D. They are the "inputs" to the R&D process. They are well defined, and known. In contrast, the "outputs" of productive R&D frequently remain unknown until the project is completed.

1.217b   Resources include:

*   People — whether highly trained scientists or labourers;
*   raw materials and supplies;
*   instrumentation and equipment;
*   buildings and grounds and
*   money.

In short, resources for which R&D managers are responsible include everything that is required to conduct R&D work.

1.217c   This even includes time. The effective use of time is crucial for the undertakings of an RDI. The effects of time limitations on scientific and technological pursuits is often recognised; but the cost element of time lost, or wasted, is often glossed-over. One of the critical resources of any RDI is time and it requires astute management.

1.217d   Now the techniques for managing resources vary with the nature of the resource among other things. For example, managing people requires interpersonal and emotional sensitivities which are not as frequently needed for managing inventories of raw materials.

What are the differences and similarities between management control and research control? How can we help R&D technical people recognise that management control is just as important and desirable as experimental control?

How can time be considered a "resource" for R&D work?

What kinds of controls can an R&D worker exert on time?

What do we mean by "time management"?

1.217e   As a consequence, R&D management includes
a variety of resource management technologies; hence,
different managers are frequently assigned to different
resources. Accountants help manage money.
Personnel specialists help manage people. Equipment ·
specialists look after the RDI's specialised equipment
and facilities.

1.217f   It is the astute management of resources
which goes the furthest toward ensuring the
productivity of R&D. Resources fuel the R&D process;
without them the process dies.

1.218a   **Creative Environment:** Researchers and
scientists are the first to point out that their activity
requires the unfettered liberty to "create", to originate
ideas and processes. Too often, that is offered as a
justification for lax management — a condition which
rapidly exhausts all resources for R&D.

1.218b   Therefore, RDI managers are faced with a
delicate balancing act. How is it possible to stimulate
creativity and the freedom to generate unique
solutions to development problems; while at the same
time limiting resource expenditures and controlling
R&D processes?

1.218c   The most common sources of breakdown in
the relationship between RDI scientists and
administrators is imbalance or disequilibrium between
needs for a creative environment, and controls on
R&D resources. One of the objective of this series of
R&D management manuals is to demonstrate that a
solution to this problem lies in sharing management
responsibilities for control, with the scientists who are
also responsible for research. Theirs is the capability
to create needed balance.

1.219a   **Research and Development Activities:** These,
of course, are the most obvious activities around any
RDI. These are the technical activities which lead to
productive solutions to the nation's development
problems. These are the activities which require the
specialised knowledge and skill of trained scientists
and researchers.

1.219b   But we would like to emphasise that they
comprise only one of the seven vital elements in our
definition of R&D management. They comprise only
one-seventh of the concepts, issues, processes and
products we will address in this management training
workshop.

*What do we mean by
"creative environment" for
R&D work?*

*What are the characteristics
of a creative environment?*

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*What are institution and
organisational threats to a
creative environment for
R&D?*

*What can be done to help
ensure the creative
environment for R&D?*

1.219c   In this discussion, we will not talk about
particular R&D technologies; we will not focus on
scientific methodologies of inquiry. Rather, we will be
talking about how all RDI personnel may improve the
probability that R&D activities lead to productive
technological innovations for national development.
We will be talking about how to increase their
productivity through the judicious allocation and
control of scarce resources.

1.220a   **Technology**: Technology is used, here, in a
most general sense. It refers to the science and
controlling forces, both natural and social, to produce
desired effects Interesting, is it not, that the word
"control" comes up again. It is key to the purpose of
RDIs. It is also key to managing productive R&D.

*What do we mean by
"technology"?*

1.220b   RDIs are designed to help society learn to
control the forces which impact it. Technology is the
collection of knowledge and processes which give
society that leverage.

*How do the concepts of
technology and control relate
to each other?*

Technology is the sometimes elusive target of R&D.

1.220c   In this course of instruction we use the term in
its widest sense. It applies to knowledge in any area:
agriculture, education, manufacturing, housing,
theology, fisheries, business economics, aerospace,
textiles, mental health, transportation, military science,
or anything else. The important point is that RDI
practices R&D methodologies for deriving or adapting,
knowledge which will further economic development
in the country

1.220d   Technology is never, here, meant to limit areas
of knowledge to those associated with the worldwide
micro-electronics industry.

*What are some principal
development problems in
your country?*

1.221a   **National Development Problems**: This is the
last, but far from the least important, discriminator in
our definition of R&D management. In many ways, the
concept of national development in R&D management
relates directly back to the first discriminator we
discussed: "effectiveness".

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1.221b   Throughout this R&D management manual, and others in the series, we presume that the ultimate purpose of RDIs is to further the economic and social development of the country. In contrast, we are not presenting R&D management strategies which are particularly necessary to increase profits in some industrial sector.

1.221c   So, by "effectiveness" in the first discriminator we are referring to reducing illiteracy, poverty, sickness, malnutrition unemployment and other conditions which inhibit the society's pursuit of life, liberty and happiness for all people.

1.221d   While ambitious, this is a goal which every RDI manager (including, especially, scientists and research workers) must keep in mind. It is a goal which must be renewed every year during the annual programme planning cycle.

1.311   **RDI Management:** Throughout this course of instruction we are talking about the management of R&D in organisations called "Research and Development Institutes" (RDIs). In any given case they may be called something else; but we use this term to refer to all variations on the same theme.

1.312   An RDI is a very special place in a variety of respects. No other organisations have the exclusive mandate to generate new technology for the sake of national development. And while it is a very demanding and challenging enterprise, it is also exciting to be part of such a venture. The excitement comes from the challenge of the unknown. Add to that the potential to accomplish significant improvements in the lives of the people, and we have the ingredients for extremely worthwhile and personally rewarding careers for all RDI personnel.

1.313   But, let us take a look at how RDIs function. What are their major functional elements? How can we generally differentiate the skills and duties of the principal people who work there?

What are some of the principal development needs — to solve these problems?

Which ones are R&D institutes working on right now?

What are the chances that the RDIs will come up with some answers for these development needs?

What is the relationship between RDI effectiveness, and national development?

1.314   For this purpose we turn to the thinking of a
Brazilian expert in R&D management, Professor
Jacques Marcovitch. He offers a pictorial model of an
RDI which is depicted in Figure 1.1, below:

Figure 1.1 Marcovitch model of an RDI
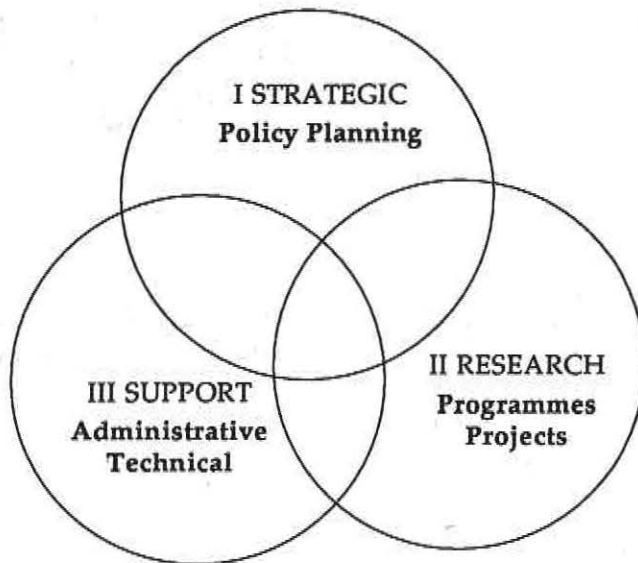
1.315   The Marcovitch Model depicts three principal
functions in any RDI. They include strategic policy
and planning (Circle I); research programmes and
projects (Circle II); and administrative and technical
support (Circle III).

1.316   Strategic policy and planning (Circle I)
includes those duties and people that try to keep track
of the long range goals of the RDI; the priority
development needs of society, which R&D work can
probably help fulfill; the resources needed by the RDI
to accomplish the R&D work; and the RDIs
relationships with principal constituents of its effort.

1.317   Research programmes and projects (Circle II)
include the actual focus of technical activity in the
RDI. These are the people and R&D activities that are
designed to generate the innovative technology for
national development. These are the specific
programmes and projects which are designed to help
fulfill the strategic goals developed and monitored by
managers operating more in the domain of Circle I.

*If you had to pick one element
of an RDI which was most
important for overall
technical productivity, which
of these three would it be:*

* *policies and plans*
* *programmes and projects*
* *administrative and
technical support*

Explain your answer!

1.318   Circle III represents a collection of RDI offices and functions which are indispensable to the people and activities operating in the other two circles. Administrative and technical support (Circle III) includes all those RDI people and activities that make it possible for others to do their strategic planning and research work. Functions like special laboratories, the motor pool, libraries, the accountants, file clerks and the typing pool, personnel specialists and purchasing people, inventory control, maintenance staff and computer specialists are just a few of those RDI activities which could be considered services to the strategic and research functions

1.319   Ideally, all three functions in an RDI are well developed, complementary and well managed. But that is the ideal. More likely, each RDI maintains a unique alignment of these three functions with management strengths and weaknesses in each. The purpose of this manual is to provide ideas which will strengthen each of these three functional areas of the RDI, and the relationships among them.

1.320   Professor Marcovitch emphasises that Circle II represents the "bottom line", or the ultimate focus of all RDI activities. This is because the R&D activities themselves, are the source of any new technologies which may impact national development. The other two functions, strategic planning and administrative and technical support, are really designed to facilitate research and development. Without R&D, there is no purpose for the RDI. And if the R&D activities are not productive, there is no purpose for the RDI. Hence circles I and II represent RDI functions which are necessary to help ensure the productivity of R&D activities.

1.321   This is an important observation because too often RDIs fail to have their desired impact because managers forget that they are in the service of R&D. Too often, they begin to act as though R&D activities and personnel exist to further the careers and status of managers in the other two functional areas.

1.322   In such cases, the RDIs become very bureaucratic; or management becomes highly centralised and authoritarian. This usually leads to severe morale problems for research people. And that, in turn, leads to the RDI's loss of good researchers and inability to attract new ones. Ultimately, R&D

What is the role of administrative and technical support people in an RDI?

In which of these three elements of an RDI will you find "R&D managers"?

Hint: Be careful! The answer is not as obvious as it may sound in the question.

Which of these three elements has the closest and most critical relationship to the clients of R&D?

Explain your answer?

Where is the emphasis in your RDI — on top management, or on technical productivity of R&D programmes and projects?

productivity suffers, and the RDI becomes just another expensive government agency which serves no useful purpose for society.

1.323   Therefore, the purpose of this training material is to stimulate sound management practices among all functional elements of the RDI. Further, it is our intent to emphasise that all people in all functions are responsible for some aspects of management in the RDI. In other words, we will not tolerate the artificial distinction between "researchers" and "managers". That is the kind of thinking which leads to a severe breakdown in an RDI.

1.324   Instead we will be focusing on management practices which are well within the purview of research workers. In fact, many of the management tasks in an RDI, like planning, budgeting, monitoring and controlling, can not be done successfully without the primary input of personnel who normally function within Circle II (R&D project and programmes). That leads to a discussion of targets for this course.

1.411   **R&D Managers**: The targets for this course of instruction are any RDI personnel who have the slightest amount of decision making responsibility. That is regardless of their sector of activity within the RDI. Therefore the term "research managers" includes a vast array of people.

1.412   One of the most important groups of RDI personnel is the research workers. These are the people who create the RDI's end-products, well or poorly, on time or late, within costs or with cost overruns. Without research workers, the best RDI planning strategies and administrative support will not improve institute impact on development.

1.413a   Therefore, we propose that "researchers" are one target for this management training. We operationally define them as follows:

> **Researchers are those research managers who are primarily responsible for the output of the RDI through:**

* Bringing specialised technology to bear on the resolution of national development problems;

* proposing, conducting and reporting research projects; and,

So, in the ideal RDI who are the R&D "managers"?

As a consequence, who do you think would benefit from R&D management training in a programme like this one?

Who are the "researchers" in your RDI? How many are there? What is their level of technical training?

How much management responsibility do they have?

How much do they want?

How happy are they working in your RDI?

How productive are they in your RDI?

*   furthering the technical productivity and
       capability of the RDI.

1.413b   The most significant characteristic of
researchers is their technical specialisation. Most of
them come to the RDI from academia where they
learned the requirements for basic research. Few of
them on the other hand, will have experienced
training on the principles and practices of sound
management in any enterprise. Most of them will
have acquired these only through experience, to the
extent they know them at all.

1.414   Therefore, every RDI will also comprise a
group of less technically-oriented managers who are
primarily responsible for selecting R&D programmes
to receive scarce resources; planning the general
direction of the RDI; appealing to government funding
sources for support; and ensuring that the RDI's
mandate is fulfilled. We therefore call these people
"strategic managers."

1.415a   **Strategic managers** give the RDI a sense of
direction. They bridge the vital gap between the RDI's
technical capability and the nation's development
goals and priorities. They are, therefore, a most
important target for management training. We define
"strategic managers" as follows:

> **Strategic Managers are those research
> managers who are primarily responsible for
> directing the whole R&D activity through:**

*How many strategic
managers does your RDI
have?*

*   Ensuring that the R&D coincides with national
       development priorities;

*What is their level of training
for the management job?*

*   mobilizing the human, material and financial
       resources needed to carry out the work of the
       RDI; and

*How much research
education and experience do
they have?*

*   establishing the fundamental rules and
       standards by which all RDI activities will be
       managed.

*How much management
experience do they have?*

1.415b   Strategic managers generally operate at the
top of the RDI hierarchy. We hasten to add that this is
not because they are, in some way, better or more
important than researchers. Rather, it is because there
they are more accessible to important people and

organisations which exist outside the RDI, and which are the principal sources of R&D needs plus finance, material and other supplies required to fulfill them.

1.415c Many of the strategic managers have research and technical backgrounds. Many of them, therefore, have a good understanding of the institutional requirements for successful R&D. With these strategic managers, training can help them adapt management techniques to the R&D environment.

1.415d But other strategic managers may already embody sound management knowledge and experience; but may lack the R&D technical knowledge. They, for example, may have originated from the ranks of the civil service in some other agency of the government. Training can help these people adapt their bureaucratic skills to the R&D environment. It can help them learn when and how to relay on technical researchers for management decisions. It can help them learn how to work together.

1.416   A third group of research managers can also be found in most RDIs. These are the critical support staff. They may have a purchasing or, they may have some research technical skills like statistics or laboratory management. But they are distinguished by the fact that their role is usually limited to one or two duties which are needed to support the functions of the researchers or strategic managers. We classify these personnel as **support staff** and define them as follows:

> **Support staff are those research managers who are primarily responsible for supporting strategic and research activities by:**

*   Collecting, combining, analysing and interpreting information on all institute operations;

*   converting institute policies to management systems; and,

*   facilitating the relationship between institute policy makers and researchers.

How happy are they in their management position?

What are their positions?

What are their principal management skill needs?

How many support staff are there in your RDI?

What are their principal duties?

Who do they "support"?

What kinds of management roles do they play?

1.417   Support staff are responsible neither for establishing the RDI's strategic direction, nor producing its technical results. They are, basically, helpers for the other two types of research managers. This does not, in any way, mitigate their importance. Can you imagine an RDI without a library, or computing capability; without a secretarial pool or maintenance department?

How do they relate to strategic managers and researchers?

How do these other two groups feel about them?

1.418   For the purposes of this training we call all three target audiences "research managers". This material is appropriate to all three of them. For a smoothly functioning RDI it is vital that all three understand the entire array of R&D management capabilities, and that they know not only how to conduct their own management responsibility; but also that they know what kinds of management responsibility to expect from managers in the other groups.

1.419   An RDI is a social system in which strategic managers, researchers and support staff work and interact. Each group has its own characteristics, attitudes, values and norms. In such a situation conflicts are bound to arise due to limitations in resources and competition for them; disagreement over goals, as well as ways and means for fulfilling them; unwelcome rules and procedures; and even, external pressures.

1.420   Part of the RDI management process is handling such conflicts through creative problem solving. It is a process of joint diagnosis, analysis of alternatives and decision making about a final solution.

1.511   **Decision-Making**: Fundamental to any management function, activity, or problem solving is the process of decision-making. It is so fundamental that some people equate it with management.

Can you outline the major steps in any decision-making process?

1.512   Managerial decision-making is a rational process of arriving at a conclusion. It starts with a clean statement of a problem which must be solved,and ends up with a choice among alternative solutions. Following are some of the general steps involved in decision-making:

*   Defining and stating the problem(s), and the goal(s) to be attained by solving it;

*   examining the characteristics strengths, weaknesses, opportunities and constraints inherent in the problems and the environment which impacts it;

*   identifying the full range of alternative solutions and working out the pros and cons of adopting each of them; and,

*   selecting one of the alternatives and implementing it.

R&D management is decision-making by strategic managers, researchers and support staff.

1.611   **R&D Management Topics:** What kinds of topics comprise management training? What kinds of management training would you like for yourself, or for your RDI colleague? Some of the standard management topics appear in the quotation which opened this chapter.

1.612   If we were to rely on the traditional eneral management literature we would offertraining topics like: planning, staffing, organising, directing, monitoring, controlling and evaluating. Those are all important topics and we would be pleased to discover RDI managers who have studied them.

1.613   However, we also feel that it would be more useful to provide management training which is more specifically adapted to the special character of management in an RDI. What kinds of special management problems occur in RDIs? And which ones are unique to RDIs in the FAMESA regions? That is the focus of this series of management manuals.

1.614   Our experience with managers in a variety of RDIs, suggest that at least the following 14 management topics would be useful:

1.   R&D Policy Development
2.   Planning and Budgeting for R&D
3.   RDI Financial Management
4.   R&D Organisation Development
5.   R&D Institute-Client Relations
6.   R&D Institute Communications
7.   R&D Institute Information, Documentation and Management Information Systems
8.   R&D Project Selection

What does "defining the problem" have to do with "making a decision"?

What management topics for training would be most helpful to you, in your position in the RDI?

List them here:

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9.   R&D Institute Personnel Management
10. Coordination of R&D Functions
11. Material, Facilities and Inventory Management
12. Monitoring and Controlling R&D
13. R&D Technical Methodologies
14. Evaluating R&D Performance

Can you think of others which would improve management in your RDI? Which of these is most important to you right now?

1.615   Careful analysis of each of these topics suggested the titles of nine management manuals. They are:

1. **R&D Strategic and Project Planning and Budgeting** (A combination of numbers 2 and 3, above).

2. **R&D Finances and Financial Management** (Combines elements of 2,3,7,8,12 and 14).

3. **Commercialisation of R&D** (Relates to the transfer of derived technology from the RDI to the end-user).

4. **R&D Management Communications** (Focusing on particular methods and techniques like number 6, above).

5. **R&D Institute-Client Relations** (Dealing with constituents at both the strategic and end-user level, like number 5 above).

6. **Project Planning, Monitoring and Control** (Focusing on how to direct the course of R&D; number 12, above).

7. **Facilities, Materials and Inventory Management** (Detailing specialised management techniques for these applications; number 11 above).

8. **Personnel Management** (Highlighting the processes of recruitment, selection, direction, evaluation, and compensation; number 9).

9. **Scientific and Technical Information and Management Information Systems** (Focusing on this vital resources for any RDI; number 7 above).

Write to us telling us of your specific R&D management training needs. We will see how we can help.

*Our address appears on the title page of this **Manual**.*

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1.616   Of course, none of these titles can be fairly treated in isolation from the rest. R&D management is nothing if it is not a holistic process. Each topic depends for its success on the successful practice of every other topic. In fact, even in this manual you will find that many of these topics arise during the discussion of planning and budgeting.

1.617   Successful R&D management depends on the fully integrated functioning of every research manager, throughout all three functions of the RDI. Also, success with any of these topics depends on adequate understanding of the processes and capabilities of every management topic.

1.618   R&D management will be successful to the degree that it involves all institute personnel in all management processes.

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CHAPTER II
R&D Institute Constituency Relationship

R&D CONSTITUENCY RELATIONSHIP

Training Objectives

By the end of this section, the participants will be able to:

1. Understand RDIs, their specific mandate and activities

2. Identify the constituencies of an RDI

3. Understand the relationship between R&D and national development

4. Identify the relationship and linkages between RDI and their constituencies/clients

DETERMINING R&D INSTITUTE CONSTITUENCY

Contents

This material may be covered in one session if studied on an individual basis prior to the session.

CHAPTER II

DETERMINING R&D
INSTITUTE CONSTITUENCY

2.111   **Introduction:** In the context of science and technology, research and development (R&D) is recognised as the important tool that helps define its function and scope. In this context, science is viewed as the systematic *study of the nature of mankind and his environment*, based on experiment while technology is the *body of knowledge which provides mankind the ability to manipulate nature to his advantage.*

2.112   **Research** and **Development** may be viewed as an investigative, sometimes original, and adaptive process using a wide range of methods for deriving and applying knowledge to enhance national development.

Why does the definition of R&D focus so much on a national strategy?

2.113   In a developing country, science and technology must be promoted in order to accelerate the development process. Since R&D is a critical tool of science and technology, it then follows that R&D is also a critical catalyst in the national development process. Development in this context must be understood as a positive change process in the welfare of a given people.

2.114   In its catalytic role, R&D thus serves as a prerequisite to sound planning and policy evolution in a country. R&D can only act in this catalytic role if its objectives and activities are in tune with national development goals and aspirations. It is only well targeted R&D which can be termed "productive" because it provides solutions to key development obstacles and proposes new alternatives to help enhance development efforts.

Where do you find a statement of your national goals and objectives?

What is the duration of your country's National Development Plan?

2.115   In order for R&D to be properly targeted and focused, there should be an attempt at an early stage to delineate a constituency and the clients on the basis of their needs and the resources available. Such an

exercise of delineation should be continuous in order to ensure that the activities of the research institution are in tune with the ever changing socio–economic aspirations of the direct beneficiaries and the public in general.

2.116   The conduct of R&D requires special people, sometimes operating specialised equipment and processes, reading and writing special types of information and drawing on resources which are allocated for these special purposes. The special nature of R&D has thus necessitated the setting up of special entities known as R&D Institutes. It should be pointed out here that not all R&D Institutes have to be grandiose physical structures. Indeed, some very important social science research programmes require only limited physical resources to be accomplished. R&D Institutes are sometimes classified as mission–oriented or client–centred.

What is the trained justification for having an R&D institute?

2.117   The advocates of this type of distinction point out that the mission–oriented RDIs are charged by the financing government to perform certain development schemes through generation and application of R&D problem solving techniques. Proponents of this distinction further emphasise that mission–oriented RDIs are often less accountable to their clients and thus show a form of detachment and apathy to their potential users. The argument goes further to emphasize the fact that client–centred RDIs are those that engage in R&D in response to the stated needs and special requests of technology users; and that such RDIs are more accountable to their users, perhaps because a profit motive is involved.

Can you draw a chart to compare and contrast mission–oriented and client–oriented RDIs?

2.118   For the purpose of the FAMESA series of manuals, it is difficult to defend this distinction. This is because even in so–called mission–oriented RDIs, government acts on behalf of clients who are the farmers, businessmen and other citizens that may eventually benefit from the work of the RDI. The distinction could thus be termed artificial since, in the long run, each RDI has to be accountable to its users by delivering the goods and services that they require, and create a favourable climate for its acceptance as vehicle of accelerated national development.

Do you feel that the distinction between the two is warranted in your country?

2.119   Notwithstanding the intellectual and other arguments for the distinction between mission–oriented and client–centered RDIs, the reader is reminded of the fact that in almost every country

there may be this dichotomy. In most of our countries, we clearly recognise those RDIs that have been set up by government to carry out certain tasks. This may be termed mission–oriented RDIs. In some of our countries, there are RDIs that have been set up by specific groups in order to carry out research into specific problems affecting a discrete section of the community. These may be termed client–centered. Examples of such institutions can be found in the primary products sectors of our economies including tea, coffee, tobacco and mining industries.

In your country, can you think of examples of RDIs that could fall into either of these categories?

Are there any that are difficicult to classify? Name them.

2.120   **Constituency**: The word "constituency" in so far as it applies to R&D has been brought out in the section on definitions. However, the word constituency is probably better understood as it relates to politics. In politics, the word applies to an electoral district and connotes the delineation of that electoral district within the confines of the prevailing laws.

2.121   The relevance and appropriateness of the word constituency in R&D arises out of the fact that just as a member of parliament has to be aware of what his constituents needs are, so does an RDI need' to be fully aware of needs and aspirations are expected as to what strategy an RDI should devise in order to satisfy the needs of its constituents.

2.122   **The Mandate**: The mission of an RDI originates from its mandate. In the process of being set up, each institution is given a mandate. The word mandate connotes the **powers** and **privileges** conferred on a given institution which give it the authority to act within certain limitations.

What is your RDI's mandate?

2.123   An institution can derive its mandate from a variety of sources. Perhaps the most commonly known source of mandate are the legislative instruments passed through acts of parliament, decrees or promulgations as the case may be. Whatever form they take, such mandates quote some legal authority under which the institution derives its mandate and status, in general terms, how the institution is expected to carry out its activities within the law of the land.

2.124   Mandates do not have to come from governments alone. A group of people may identify a need, set up an authority and then empower a subsidiary under that authority to carry out certain activities. Since the administering body is an

How well informed are members of your RDI of the mandate of your institute?

authority, the authorising arm gives the mandate to the implementing arm.

2.125   Mission–oriented RDIs: In Eastern and Southern Africa, one clearly sees a variety of institutions deriving their mandates from various authorities. Perhaps, the majority of our institutions are those that derive their mandates from one source of government legislation or another. These are often regarded as mission–oriented institutions.

2.126   The first group of such public institutions are those that operate within the authority and confines of the ministries and set up by appropriate authorities in government. In the case of Kenya, such authority is vested in the President of the Republic. Such institutions are clearly identifiable in the Ministry of Agriculture and Livestock Development in Kenya. They are set up as research stations assigned mandates to carry out research on specific crop commodities, or in line with certain agroecological farming systems. Among the former are the National Agricultural Research Station in Kitale with a mandate on maize; and the Potato Research Station in Tigoni with a mandate for research on potatoes.

Among the latter are the National Dryland Farming Station in Machakos, and the High Altitude Farming Station in Ol Joro Orok, each carrying out activities related to its mandate.

2.127   Such institutions are normally not given strict mandates. Their operations could from time to time be varied depending on the prevailing priorities of the Ministry in question. However, such institutions are supposed, in theory, to be closer to their extension services and agents so that the outputs from their efforts are easier to translate into tangible activities by the users of their R&D output. In practice, however, this does not seem to be the case.

2.128   The second set of mission–oriented research institutions are those that are set up as semi–autonomous institutions. Such institutions are usually described as parastatal with a Board of Management overseeing the activities of each one, under the overall direction of a parent ministry. Such institutions have clearer, but more rigid mandates which, if they have to be changed, may necessitate going back to parliament or invoking a certain statutory procedure. The list below gives some of the

How was the mandate derived?

Give examples of mission–oriented RDIs in your country.

institutions under this system as it pertains to Kenya, with their mandates in brackets:

*   Kenya Agricultural Research Institute, KARI (Agriculture, veterinary, forestry, science)

*   Kenya Industrial Research and Development Institute, KIRDI (Industrial and allied technology)

*   Kenya Medical Research Institute KEMRI, (Biomedical sciences)

2.129   **Client–centered RDI**: These are RDIs that often engage in R&D in response to the stated needs and special requests of technology users, who pay for these services. The mandates of these institutions cover the commodity or activity in question and as much as possible try to answer the problems of that particular industry. In Kenya, examples of such types of institutions include the Coffee Research Foundation, and the Tea Research Foundation. Other countries have specific institutions that carry out research into problems of tobacco, minerals, sugar–cane, etc. that are important to the country.

2.130   **International RDIs**: Kenya is host to a number of RDIs that derive their mandates from international agencies of one type or another. The most clear one in this line is the International Laboratory for Research in Animal Diseases, ILRAD, which derives its mandate from the Consultative Group for International Agricultural Research, CGIAR group, to work on animal diseases of the tropics.

2.131   The second such institution is the International Centre of Insect Physiology and Ecology, ICIPE, which is unique in that although ICIPE was initially established under the Companies Act of Kenya, it was established as an international research centre with headquarters in Nairobi and an international governing body which is responsible for approving its scientific programmes and resource allocation.

2.132   The mandate of a client–oriented institution may read as follows: "To carry out research integrated control methodologies for crop and livestock insect pests and other related arthropods, as well as insect vectors of the tropics (especially in Africa); and the

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strengthening of scientific and technological capacities of the developing countries in insect science; and its application through training and collaborative work."

2.133   This and many other examples give the scopes of mandates. Some mandates may be so specific that they map out the constituency clearly. Others are left sufficiently broad to embrace a larger clientele of (Biomedical sciences) and yet others can be so pervasive.

2.134   However, it would suffice to say that wherever an organisation derives its franchise from, such a franchise includes a mandate which in broad terms delineates the approximate boundaries of the activities of the institution. This delineation is thus the first step in identification of the constituency, and as a consequence the clients of an RDI.

2.135   The need to periodically review mandates cannot be over emphasized. RDIs should continually review their mandates and if there are any shortcomings, they should initiate steps to have such mandates revised, updated or even overhauled so as to keep abreast of changing socio–economic conditions in the country.

Has the mandate of your RDI been revised in the last five years? If so, why?

2.211   **Interpretation of the Mandate:** This is a very important step taken after receipt of the mandate and carrying out a rapid survey of potential clients needs. As was mentioned earlier, the mandate lays down in broad terms, the boundaries of the institute's activities. However, it is for the authorities in the institution — usually a Board of Management or Scientific Programmes Committee — to interpret the broad mandate in order to elaborate specific objectives and identify what activities are permissible within the institute's mandate.

Who is responsible for the interpretation of your RDI mandate?

2.212   Assessment of Constituency Needs: On receiving a mandate, an RDI should engage in a survey of the potential clients. Such survey should reveal, as superficially as possible, the needs of the potential and constituent clients. The subject will be expanded in Chapter III. Let us however, illustrate this by looking at an institute that has been given a mandate to carry out research into human nutrition in a given country. It would be absolute folly for the institute to start engaging in expensive metabolic studies without ascertaining the nutritional problems and the perception of the constituents of the problem

of nutrition themselves. It may be a problem of lack of foodstuffs, micronutrient deficiencies, poor food preparation and endemic diseases. A rapid survey to reveal the major problems of the potential clients will greatly help in establishing the direction the institute should take in delineating its boundaries. The methodology and instruments for such surveys will be brought out clearly elsewhere in this **Manual**.

Which is the fastest method of information for a rapid survey?

Proper interpretation of its mandate enables an RDI to encompass the constituents and clients. It is important in the interpretation of the mandate to try and be as all embrassive as possible but to ensure that an RDI to the extent of not being able to function within the constraints of the available resources.

2.213   **Resources**: The word "resources" brings together those **inputs, materials or otherwise which help any institution achieve its goals and objectives.** In the case of an RDI the two most critical resources are **human and financial** resources. Human resources are difficult to retain. In a situation such as ours in developing countries, this resource becomes even more critical because of dearth in certain areas, misdeployment in others and continuous brain drain. In determining the constituency, the RDI must take this limitation into account and avoid giving false hopes to potential clients about its capacity to delivery.

2.214   The second limitation on resources is financial constraint. Funds to support RDI activities are dwindling in the face of global inflation; thus the need for more stringent measures for project selection and financial controls. This factor plays a big role in determining the quality of researchers, materials availability and research productivity.

What are the likely effects of the budgetary constraints on the output of an RDI?

2.215   Priorities are important in any aspect of management because they help focus the use of limited resources in order to achieve productive and tangible output that can help sell an institution. This is particularly crucial in research where break–through is not so frequent. Thus, in developing research priorities, an RDI must take into account the national development goals, objectives and plans, political pronouncements, the social, cultural and economic values of the people, the mission and mandate of the institution, the needs of the potential clients and constituents and; lastly the resources available to the institution from time to time by being aware that they are continually diminishing.

2.216   Although priorities are difficult to draw up they should be clearly laid down after extensive consultation with all the linkages within the constituency clients both immediate and potential. Priorities should be continually reviewed to ensure that they keep pace with the rapidly changing socio–economic and technological conditions. An RDI without priorities that are continually reviewed is like a bus without a driver or at best with an incompetent driver. The consequences are disastrous to the RDI!

2.217   **Relationships**: Perhaps one of the significant steps in determining an RDI constituency is the identification of appropriate relationships RDIs should forge with clients.

List the linkages between your RDI and the other institutions and organisations. Suggest ways to improve the relationships.

2.218   A national RDI must develop relationships and linkages with government institutions and agencies as these facilitate adoption and the application of R&D output. (see publication list p. 62). The other reason for such a relationship is that governments are often the financiers of RDIs. Relationships with donor agencies and others must also be developed. Linkages must also be forged between the RDIs and the suppliers of intermediate goods such as chemicals, drugs, stationery, etc.

Of utmost significance are the users of the technology such as the farmer, the industrialist, etc. Table 2.1 attempts to portray these relationships and linkages in a matrix and identifies the types of linkages envisaged at various levels of interaction.

What is the feedback mechanisms in your RDI?

2.311   **Packaging and Dissemination of Information**: It is generally agreed that the first output of any R&D activity is information of one kind or another. Such information can be translated into a procedure, product, a capital good or simply help to enrich our knowledge about a given subject. Such information may in the long run be used to effect change in policy or to revise old and often accepted norms of doing things.

2.312   Whatever the end product of R&D activity, such information needs to be structured and prepared in such a manner that various audiences can get access to it, utilise it to their benefit and for the enhancement of the institution's standing in the public eye.

2.313   Different strategies have been developed for packaging and dissemination of information. Chapter

VII of this **Manual** goes into detail of such strategies. However, suffice it to say here that various clients in a constituency need different aspects of an R&D output. It is for the RDI to anticipate the information needs of its various clients and prepare information packages to suit each audience giving them relevant information.

2.314   **Feedback:** This is probably the most critical element which must be built into activities of the RDI for it to continue to perform to the expectations of its constituency. Feedback mechanisms are a type of self monitoring and evaluation and help to pave the way for future activities of the RDI. Such feedback can be programmed in a type of public liaison section of the institution whose main duties are to continually assess the views of clients with the aim of making appropriate changes. This RDI section should analyse all complaints, compliments and statements both from public and private sources that relate to the RDI and periodically make reports to the management for discussion and possible inclusion into the day to day activities of the RDI.

In your RDI, is there a feedback mechanism that ensures that the views of constituents are taken care of?

2.315   There is always a danger, however, that this group may feed the administration only with the information that is palatable, and keep otherwise constructive criticism or dismiss it as hearsay and rumour. This is a dangerous situation that should not be encouraged in an RDI that ought to be dynamic in its outlook.

2.316   **"Walking the tight rope":** It would be wrong to give the impression that once an RDI has gone through all the steps enumerated in this chapter, it has achieved a major feat. Identification of a constituency and clients is only the beginning of a long road in the management strategies of an RDI. The institution continues to face challenges and must surmount them if it is to guarantee its existence.

2.317   An RDI is set primarily to carry out and generate knowledge, information or technology. It has of course to do this within the confines of its mandate, resources and expectations of its environment. A research institution must endeavour to carry out research that enhances both the image of the institution in the eyes of the public and contributes positively to national development.

Could you think of examples of RDIs that have been successful in walking the tight rope and those that have not been so successful?

Table 2.1 RDI/constituent relations and linkages

Client	Financing	Staffing	Joint R&D	Information books publications	Paid services	Sub-contracting	Demons-tration	Welfare supplies	Efficient	Training
1. Government organisation	•	•	•	•	•		•		•	•
2. Donors and finances	•	•		•					•	•
3. Universities	•	•	•	•	•	•	•			•
4. Industry	•		•	•	•	•	•			•
5. Users of technology	•		•	•	•		•			•
6. Providers of inputs				•		•			•	
7. Supplies of intermediaries				•					•	
8. Other RDI (peers)		•	•	•		•				•
9. Individuals			•	•	•					
10. Libraries				•						
11. International community	•		•	•						•
12. Family of staff								•		
13. Public and media etc.	•	•		•	•		•	•		

2.318   In our definition of constituency, we indicated that it is a collection of individuals, institutions and pressure groups for whom the results of research are meant. This definition is pertinent and shows the diversity of interests, expectations and pressures that can be brought to bear on an institution in the course of its operation. There is no easy prescription on how to walk this path. However, that management in any RDI has to take cognizance of the forces which may sap and orient the energies of an RDI institution to unproductive ends. The management must not engage in the exercise of apportioning blame. They have to build mechanisms of self–appraisal and criticism and be able to meet any challenge with facts and not on hearsay. They have a duty both to protect themselves, the institution and the public so far as their activities are concerned.

Can you suggest ways for improvement of linkages between your RDI and its constituents?

2.319   The ability of management to steer the institution in the right direction must be strengthened. However, the ability of both management and the institution to walk the tight rope of conflicts and interests and remain balanced is probably the greatest measure of viability. RDIs are expected to play the role of a guiding star to the nation by being productive all the times.

2.320   **Conclusion**: Research and development is widely regarded as the most critical tool of science and technology for national development. R&D has to be productive if it is to play its rightful role in furtherance of the goals, objectives and plans of the nation.

2.321   In order to be productive R&D has to take into account that the users of its technology and, as such, its constituents are the most important linkage to its activities. In order to map out an all embrasive constituency, RDIs must critically review their mandates, and use knowledge to formulate their priorities in a way that the needs of the constituents are taken into account at every stage of development of the RDI. This can only be achieved· if proper linkages are forged with clients and mechanisms built into the activities of the RDI for proper feedback to be received from constituents on the R&D outputs. Productive research and development to enhance national development cannot be achieved if an institution binds itself in a tight cocoon and isolates itself from the mainstream of the flow of national development activities.

Determination: Selected reading for more study

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CHAPTER III
ASSESSMENT OF R&D INSTITUTE-CONSTITUENCY NEEDS

ASSESSMENT OF R&D INSTITUTE CONSTITUENCY NEEDS

Training Objectives

By the end of this chapter, the participants will be able to:

1. Understand how to identify R&D Institute Client Needs

2. Understand the RDI mission, needs and resources

3. Understand the differences between the RDIs in terms of their mandates, needs, resources and activities

4. Define the terms used in information gathering

5. Appreciate the components of an ideal RDI activities in terms of objectives, resources and need

6. Explain the process of client needs

7. Understand the role of systematic approach of information gathering on client needs

8. Appreciate the methods commonly used in information gathering on client needs

9. Understand the importance of systematic approach to the design of studies, sampling techniques, analysis of data, etc

R&D INSTITUTE-CLIENT NEEDS ASSESSMENT

Contents

All this material can be covered in one session, if it has been studied on an individual basis prior to the session.

ASSESSMENT OF R&D INSTITUTE-CONSTITUENCY NEEDS

3.111   **Introduction**: Chapter I of the FAMESA Manual Series I on **Strategic and Project Planning and Budgeting** has dealt with the similarities and differences of RDIs in terms of their relationships with the constituency and clientele. A further discussion on mission–oriented and client–centred RDIs is also made in Chapter I of this Manual. In Table 3.1 a contrast of the two types of RDIs and the technologies they represent is given.

Although efforts have been made to place some RDIs in specific types, activity–wise, the classification is very difficult to make.

Can you indicate to which type your RDI belongs?

Table 3.1: Examples of few types of RDIs and their mandates

RDI	Type of Mandate
National standards bodies	Testing quality control, quality improvement, product development technology transfer, consultancies
Centre for industrial research	Testing quality control, process development, consultancies, testing quality control, process development, consultancies
Geological surveys	Product development, consultancies
Meteorological stations	Monitoring, information processing
National councils for scientific research	Research promotion, coordination and/or control of research, information and documentation
Forestry) research Fisheries) institutes Agricultural)	Research activities, product development, quality improvement, servucesm consultancies, etc

3.112   The mandate of an institution defines its
activities and determines the limits of its efforts.
Overlap of RDI corporate mandates leads to
duplication of R&D efforts of different RDIs in
satisfying constituency needs. A survey must be
carried out of all RDIs already existing so that clear
mandates are to new institutions.

Efforts should be made to ensure that institutional
mandates do not overlap; that they relate to national
objectives and are supportive rather than competitive
with those of other institutions. It is important that
formulation of corporate objectives should involve a
wider group of relevant persons and institutions to
facilitate extensive consultations before the "Cabinet
Paper" is prepared.

3.113   What is important is that RDIs must adopt a
strategy that leads to productivity in R&D. Many
RDIs, including several parastatal corporations are
closing down in Africa because governments are
unable to discern their tangible outputs. RDI
personnel are sometimes not well versed in the raison
d'etre of their organisation. It has been observed that
some researchers scarcely know much about the
mandates of their RDIs. Neither do they make any
efforts to understand:

What	is the mandate of the their organisation?
	are the needs of their RDI's clients?
	their job is all about?
Where	the RDI is going?
	new research ideas, funds and
	clients can be obtained?
When	goals must be met?
	should the clients be contacted?
	for needs assessment?
Who	should be contacted for
	information on clients?
	should be informed on progress?
	benefits from the results of their research?
Why	the RDI is in existence?
	the department is in operation?
	the research is required?
	the present method and/or
	approach is used?

What   resources are available for
             achieving the objectives?

Who   should conduct the needs assessment?

There are many other what's where's, when's, who's,
how's and why's as appropriate.

3.114   In a client needs assessment, the RDI should
possess the necessary ingredients such as the **scientific
staff, administrative staff** and the **professional
market survey** specialists. The administrative staff will
interpret the science and technology policies and the
RDI mandates into objectives; the professional survey
specialists will assess the needs of the constituency
and the clients which are consistent with the RDI
objectives; and the research scientists will finally
develop research programmes and projects meeting
the needs of the constituency and clientele.

3.115   The knowledge about the needs of the clients
and the institutional mandates are as important as the
capability to develop sound research proposals or to
conduct effective research. The RDI managers should
ensure that no research programmes, workplans,
projects, or research budgets are produced before
adequate client needs assessment is conducted to
avoid expensive mistakes and ensure that the projects
are aimed at meeting the needs of the constituency and
clientele. RDI programme objectives should be flexible
enough to allow for basic research which is necessary
to the generation of knowledge in order to satisfy the
needs of scientists.

Why should clients'needs be considered at the stage of
developing the mandate, objectives, budget and
workplans of an RDI?

3.211   **Definitions: Assessment** is an act of
estimating the importance or value of something.

3.212   **Need** refers to a circumstance in which
something is lacking but is felt necessary.

3.213   **Want** is an expression of inadequacy, absence
or desire for something which has been required for
sometime.

3.214   **Survey** is a detailed study used in gathering
and analysing information. It is a comprehensive
study or examination whose activities are similar to
those involved in assessment.

*These questions provide a
checklist for an RDI needs
survey. Compile information
about your RDI using this
checklist.*

3.215   **Fieldwork** is an activity where information is gathered by a researcher or fieldworker from a predetermined area or target group following specific guidelines on information gathering. Such target groups or areas can be a country, an institution, a place within a country or an ecological zone.

3.216   **Terms of Reference** are guidelines laid down to control the tasks required by a particular activity or assignment. These guidelines provide the extent to which a surveyor, or fieldworker should go in collecting information and preparation of a final report.

3.217   **Survey Instrument** is a checklist of questions and/or statements to assist the fieldworker in collecting all the required information. A survey instrument is essential in ensuring that at the end of a fieldwork or survey all the questions have been answered and all the information obtained.

3.218   **Questionnaire** is a written or printed checklist of questions used in gathering information from one or more persons in a given target group.

3.219   **Client** is a person, company, institution or government (department or ministry) patronizing an establishment regularly.

3.311   **Components of ideal RDI Activities**

The first major task of the RDI manager is to interpret the RDI mandate and other science and technology policies into R&D programmes and projects. This interpretation should be followed by client needs assessment before the final R&D programmes and projects can be worked out. Thus an ideal RDI should have a proper balance of the following three activities: objective setting, client needs assessment and resource allocation and utilisation.

Figure 3.1 shows diagrammatically the interrelationships of these three components.

3.312   The interposing areas imply that subset 4 is indicative of adequate objectives and resources only; subset 5 relects adequate objectives and needs assessment; subset 6 is an area of adequate resources allocation and utilisation and needs assessment. Subset 7 is the ideal, go–ahead, combination; the area of greatest interaction.

Exercise 3.1 Looking at Figure 3.1 answer the following questions:

1.   What explanation can you give for the areas 4, 5, and 6 where the circles intersect?

2.   Is it possible to find an RDI with any of these circles not intersecting one or two others? What explanation can you give?

3.   Would your explanations be in favour or against an RDI if the areas 4,5,6 and 7 were to become larger? Explain.

4.   What would the Venn diagram for ideal RDI activities look like?

3.411   Identification of Client Needs

Chapter II of this **Manual** has discussed the steps necessary for the identification of clients and RDI constituency. The identification of clients and their needs is the primary activity of the RDI management at the stage when R&D programmes of work are being defined and project proposals formulated. Before the client needs can be identified it is important to identify the clients. For an existing RDI, the approach is to examine the institutional records of the clients patronising the services and other secondary data. For newly established RDIs, a thorough examination of the mandates can give insights into the nature of research activities, the clientele and beneficiaries of the research results and/or services. Each group of clientele or beneficiaries has its own specific types of needs. Thus it is hardly possible to assess the needs of clients or beneficiaries without accurately identifying the beneficiaries or clientele themselves.

3.412   The consequences of developing R&D programmes of work and research proposals without assessing the needs of clientele and taking into account their needs can range from rejection of the R&D results to an expensive wastage of resources and efforts and to, sometimes, closure of the RDI operations. If we look at Case 3.1 there are a few lessons we can learn namely:

*   the RDI concerned spend five years of research on a new high–yielding maize variety which met the mandate of the constituency (in this case the government);

*   the RDI failed to meet the needs of the clientele who are the smallholder farmers and this failure led to a total rejection of the R&D results by the beneficiaries.

3.414   The social and natural scientists responsible for market research and client and constituency needs assessment should always ensure that information on the needs of the clientele and constituency are made available to the RDI managers to assist them in the proper interpretation of the mandates into relevant research programmes and proposals.

3.511   It is important that when selecting a sample of clients to be visited during a survey bias and prejudice should be minimized as far as possible. This can be done by use of a random sampling method where each sample is given an equal chance of being selected. This sampling has valid mathematical or other sound justification to ensure that a given sample, appropriately drawn and subsequently validated will yield results which are reasonably representative of the totality of client needs.

Gathering information in marketing is known as market research and is concerned with collecting and analysing "facts" about a situation, place, condition, environment, etc. that will help management to do a better job of planning, executing and controlling.

3.512   For productive R&D, the RDI manager should provide in the organisation for a Documentation and Information Department charged with the responsibilities for information storage, retrieval and dissemination as well as public relations. This department should be manned by documentalists, librarians, social and natural scientists to conduct fieldwork, surveys, aptitude tests, etc. The market research experts (social and natural scientists) would provide RDI managers with invaluable services in the assessement of clientele and constituency needs.

A systematic and professional approach is always necessary for an RDI manager to obtain and utilise information which is both accurate and free from bias and prejudice. One of the advocated approaches involve the following steps:

Case 3.1: An RDI in the FAMESA region was charged with the mandate by its government to increase food production. Maize being the staple crop in that country a project to develop maize variety was formulated without prior assessment of the needs of the clientele. After five years of research, the RDI came up with a high yielding maize variety which fulfilled the mandate given by the government. However when presented to the smallholder this variety was rejected because the kernels were soft and could not stand the traditional pounding during the dehusking process using the pestle and mortar.

Can you mention other sampling methods you have come across? Discuss their merits and demerits.

Can you think of a case study in your country where R&D results were rejected or were not easily accepted by the beneficiaries and the reasons for that hesitation or rejection?
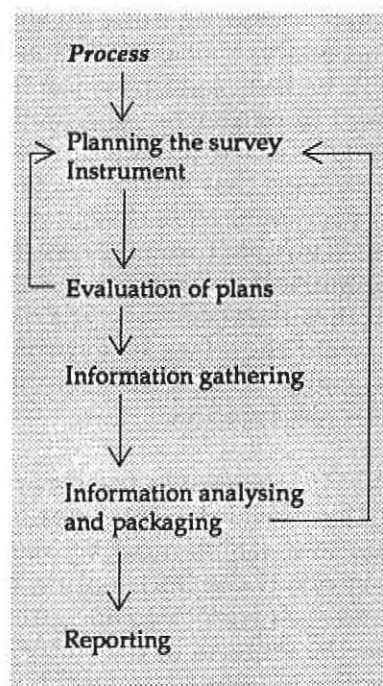
What should be the role of the Documentation and Information Department in terms RDI Institute Client Relationships?

* establish the objectives of the survey;
* understand the clientele needs and purpose of the survey;
* set forth hypotheses as to the likely causes and/ or possible solutions of the clientele needs or problems;
* determine what information is required and how accurate it should be;
* decide then which methods or techniques should be used to achieve the desired quantity and quality of information to be collected;
* collect information;
* compare the collected information with hypotheses and review original assumption if necessary.

3.513   It is very important that some steps are followed at the stage when the information gathering activities are being planned. This will go a long way in improving the quality and accuracy of the desired and collected information and in reducing bias and prejudice. The planning process for information gathering strategy should involve a checklist of questions as guideposts to ensure that the right quality and accuracy of the information are collected and that bias and prejudice are minimized. It is important to establish what specific information is needed; the best possible sources and method for obtaining this information; limitations on the method or source of information; steps to be taken in obtaining the information and checks, if any, can be established in order to protect information gathering activities to ensure accuracy and freedom from bias prejudice.

3.514   The planner of the fieldwork or survey must also ensure that the type, accuracy and quality of the required information matches the use to which the information will be put. The methods to be chosen, the type of report to be produced and other factors affecting the information gathering process should be borne in mind as the RDI manager finalises the survey instrument and terms of reference of the fieldwork.

A decision must be made regarding the nature of the report, its level of acuracy expected, requirements of the report, the consequencies of accurate report, limiting factors such as time, money, special conditions, ets. likely to affect acquistion of information and preparation of the report, essential analysis, interprelation and follow up.

Process

↓

→ Planning the survey ← Instrument

↓

Evaluation of plans

↓

Information gathering

↓

Information analysing and packaging

↓

Reporting

Can you list some of questions you should ask yourself during a survey exercise?

3.515   Having done all this preparatory planning
and analysis of intended activities, the RDI manager
will be in a good position to choose the method to be
used in gathering information on the needs of clients
and/or constituency. It should be mentioned,
however, that before the target groups are selected it
is necessary to realise that most government
institutions, universities UN agencies, international
organisations and other similar bodies are packed
with published and/or printed information and
should therefore be exhausted first before moving out
to countercheck the accuracy and up–to–dateness of
the information.

3.611.   **Methods for Information Gathering on
Clients Needs**: Information gathering is a specialised
activity which must be planned and executed by
experts if the information required is to be accurate
and free from bias and prejudice. Market researchers
— the experts in the fields of information gathering —
have developed several techniques and methods they
now use in information gathering, needs assessment
and attitudes testing. The steps followed in
information gathering are:

*   Deciding on what quality, type and quantity
        should be collected.
*   Choosing the target group from whom
        information will be collected.
*   Choosing the most suitable method amongst the
        following, telephone survey, mail
        (questionnaire) survey or personal interview
        (mission) survey for information gathering.
*   Developing guidelines, terms of reference or
        objectives of the survey in line with the method
        to be used.
*   Designing a survey instrument for use by the
        fieldworker to ensure that the required accuracy
        and quality of the information gathered are
        achieved.
*   Establishing procedures of analysing and
        packaging the crude information into the
        required form for use by the RDI manager.
*   Preparing a final report on the fieldwork.

3.612   In deciding on which method or technique to
use the, RDI manager should first of all acquaint
himself with the efficacy of each of the method or
technique in relation to the quality and accuracy of the
information required. The choice of one method or
another is based on the suitability to and compatibility

with the target group selected, the nature and accuracy of the information required, and the use to which the information will be put.

3.613   The following methods for information gathering on client needs are used: **The telephone interview** is mostly used in situations where quick answers to short and simple questions are employed. The disadvantage of this method is that it can only be useful in developed countries where telecommunicationssystems are well developed and established. Most parts of the rural areas in developing countries are inaccessible by telephone let alone by roads. In using the telephone survey method, the following guidelines should be borne in mind:

3.614   **The mail survey** is useful where checklist of questions is long and it is not possible to state the questions briefly and receive the answers immediately. Although the developing countries have several communication problems, it is still possible to send letters from one country to another and expect to receive a response eventually. The questionnaire commonly used in mail survey, allows the fieldworker to reach potential respondents in many places including countries. It also allows the respondent to take all the time (of course within the specified period of responding) he wishes to answer the questions and to fill in, if he so wishes, personal details.

3.615   **Personal interview** survey is used frequently because most people would rather talk than write. Most chief executives in public and private organisations can afford time for discussion. Personal interviews may be expensive if a large number of people or institutions are to be interviewed or several countries visited. Inspite of all these expenses, personal interviews offer the fieldworker the best opportunity to probe deeply on certain questions otherwise not anticipated during the planning stages. New hypotheses or even new problems never thought of before might be uncovered in a personal interview. The personal interview gives the fieldworker an opportunity to judge the socio-economic characteristics and follow-up on those individuals who would not ordinarily answer mail questionnaires, especially the busy executives.

3.616   It is very interesting to note that governments, UN agencies, international institutions, etc. use a combination of questionnaire surveys and personal

Examples of three survey methods are:
* *telephone*
* *mail*
* *personal interview*

List down other advantages and disadvantages of the telephone methods in terms of cost, accurate quality, bias, prejudice etc of

List down the advantages and disadvantages of the mail survey method using questionnaires.

List down the advantages and disadvantages of the personal survey method.

interviews in information gathering. After collecting secondary data in the libraries of universities, UN agencies, governments, international bodies and others, more accurate, unbiased and unprejudiced information can be collected through a combination of the questionnaire and personal interviews provided that an accurate choice of the clients from whom information is to be obtained is carefully made. In fact, this approach is most effective in developing countries and should always be employed when need arises to physically gather additional information.

Terms of Reference

3.617   Once a survey method has been chosen, the *modus operandi* becomes quite clear and the quality and accuracy of the information can be established. It is then after this that guidelines or terms of reference to provide the freedom and limitations of the operations of the fieldworker. It should be emphasized that the success of a fieldwork depends on the accurate formulation of the terms of reference, survey instruments, and measurable objectives.

Example 3.1: FAMESA Fieldwork Survey to assess Curriculum Needs of R&D Managers (1985)

Terms of Reference

To consider various problems in the areas of ...and to develop and design an appropriate survey instrument to be used in the fieldwork;
* to report on training needs of these (institutions in the countries visited) in the areas of ....
* to collect documentary material which might be used in the curriculum development;
* to identify various resource persons in those institutions visited, being persons who will be able and willing to participate in workshops organised by FAMESA;
* to identify various institutes which might be used as suitable visited sites during delivery of training programmes or as training hosts;
* to generally publicise and promote FAMESA in those institutes and countries visited in an attempt to create an increasing awareness of the role of FAMESA in the region;
* to visit a variety of designated institutes in (designated countries);
* to prepare a report on findings.

Exercise 3.2 Imagine you have been assigned to prepare terms of reference for a fieldworker to undertake a survey on client needs for a hybrid maize. List the essential objectives and specific activities which can be included in the terms of reference.

Survey Instrument

3.618   Like the preceding task of developing the terms of reference or objectives of the fieldwork, it is also very important to give special attention to the designing of a survey instrument. A survey instrument provides specific instructions to a fieldworker on the conduct of a survey, the statements upon which questions are framed to obtain specific information and establish the degrees of freedom and limitations of details of which form the object of formulating questionnaires and conducting personal interviews during a fieldwork. The survey instrument is the basic source of material used in designing a questionnaire.

What is the major difference between the survey instrument and a questionnaire? Compare your answer with that of your colleagues.

3.711   **Analysis and Interpretation of Information Gathered**: It should be emphasized here that interpretation and presentation of final results provide a clue to the quality of the survey and its planning. Without effective analysis interpretation, presentation and follow–up of results, careful planning of preliminary steps may be of little value.

Why should the information be analysed and interpreted before report writing?

3.712   Once the information has been gathered, it is necessary to check and compare it with the survey instrument to ensure that the survey has been completed in compliance with the terms of reference.

Further examination of the collected information is necessary to:

*   establish the extent to which the desired, accuracy and quality have been achieved;

*   compare the gathered information or results with the hypotheses and review, if necessary, the original assumption;

*   establish the extent to which the results lend itself to objective analysis and interpretation;

*   validate the extent to which the results can be relied upon as representative views or needs of the relevant population;

*   whether or not the problem appropriate questions have been answered by the data;

*   establish the extent to which the data provide an insight on the likely causes and/or possible solutions of the clientele needs or problems.

3.713   After obtaining satisfactory answers from the above questions, the next step is to process the raw data to obtain information to facilitate its analysis and interpretation. Analysis of data substantiates and eliminates the hypotheses set forth at the planning stage. The validation of the hypotheses will prove that the planning of terms of reference, the development of the survey instrument, and the choice of survey were successful. Appropriate treatment of data employing statistical techniques is used to reveal certain trends, significance or preponderance of certain characteristics, needs or view points. Frequency distribution, graphical presentation or numerical indices such as various average, mean, range, standard deviation, etc. are commonly used in the analysis of numerical data.

What next step should be taken if the information gathered is found not to be validate the hypotheses?

3.811   **Packaging of Information**: After the analysis and interpretation of information and data collected, and before embarking on report writing the information should be sorted out according to the significant aspects of the project. At this stage more time should be spent on planning the layout of a

report. The recognised parts of a report should include:

* title page
* foreword
* abstract, summary or synopsis
* contents list or table
* introduction
* body of report
* conclusions
* recommendations
* appendices
* bibliography
* glossary, etc

List down the parts of a report you are familiar with.

_____

_____

_____

_____

_____

_____

Few reports would have all these, but the list may be taken as fairly standard up to recommendations.

3.812   An **abstract** is an important part of a report because it summarises the whole report on less than a page. It incorporates the following:

Why is it sometimes necessary to have an abstract, summary or synopsis preceding the report?

* the intention — a brief statement of the purpose and scope of the report.
* what has been done or observed and how it was done — a very brief outline?
* the findings
* the conclusions
* the recommendations

Sometimes it is necessary to introduce a part on an executive summary which provides the RDI manager a quick overview of the report without having to read the whole report. A report which does not have action implications has very little value to the RDI manager and may even suggest, at least, to management poor planning by the researcher. The reliability and research methods should come out clearly to assist the RDI manager in evaluating and further utilisation of the data. In fact, the researcher should not be surprised if the RDI manager chooses to ignore the report if methods are not explained and action implications suggested.

3.813   In conclusion, the following checklist of questions are worth considering when the researcher is planning his report:

* Have I determined exactly what it is that I am attempting to do?
* Have I evaluated all the various methods of obtaining information?

* Did I make the best use of the material and facts on hand?
* Have I outlined my report so that I know that the information I have collected fits my objective?
* Have I determined my audience level and have I kept my writing level to the audience I am addressing?
* Have I made up my mind just exactly what it is I am trying to convey in my report? What specific thing am I doing in this report?

3.911   **Report Writing:** After validating the collected information against the hypotheses, and analysing, interpreting and classifying it into topics and subtopics according to the relevant parts of a report, the next step of writing the report will not heavily tax the literacy competence of the researcher. The researcher is required at this stage to prepare an outline of his report. By putting the outline of his unwritten report on paper he ensures that the report will follow a pattern to which full consideration has been given. The outline provides a useful means whereby he can crosscheck with the terms of reference, survey instrument, and other relevant guidelines that he is working along the right lines.

Why is it necessary to prepare an outline of the report before the report writing process?

3.912   This activity enables the researcher to present his facts in a logical fashion and sequence with adequate supporting information and illustrations. By the time the researcher comes to writing his report, he is not faced with a blank sheet of paper. He has before him the skeleton of the whole report in note form — chapters, sections subsections, headings and subheadings — together with all the points to be made and aspects to be dealt with. The major part of the presentation of the gathered information has thus been accomplished with the least strain on the researcher's literary ability.

3.913   The working principles of the researcher ready to write his report requires that he shall

* always have the reader and his experience in mind;
* choose short familiar words if they convey the correct meaning;
* avoid long–winded and roundabout expression;
* normally write sentences of not more than 25 words because they are easier to write and follow and quick to read;
* prefer the active to the passive;

* avoid double negative, except where they are intended to express a neutral state;
* use adjectives and adverbs sparingly;
* not use emphasis words unless they are warranted;
* try always to be specific and precise;
* not exaggerate;
* write to inform, not to impress and
* try to simplify, justify and quantify.

3.914   When the report writing is done, it is important to review the report to ensure that the quality of presentation has been maintained throughout the report. The following checklist of questions would provide the necessary appraisal of the aspects of the various parts of a report:

3.914a **Logic:**

* **Title:** Does it identify the report?
* **Terms of Reference:** Have they been adhered to?
* **Introduction:** Does it set the scene and provide sufficient background information for the reader to understand the report?
* **Body of Report:**
  * Are the sections complete?
  * Are the headings meaningful and suitable?
* Is the sequence logical?
* Are there any missing links in the chain of thought?
* Are any parts so detailed or voluminous that they impede the reader's progress? If so, appendices are needed.
* Are any parts inconsistent with the argument in other parts of the report?
* Is there a clear differentiation between established fact and personal opinion?
* Are any parts irrelevant?
* Has the reader been taken sufficiently into account in the presentation of the facts observations, ideas and illustrations?

Conclusions:

* Are the conclusions warranted on the information given?
* Are they clearly stated?
* Do they indulge in special pleading for the case that suits the purpose of the writer?
* Has the impact of them upon the reader been fully considered?

* Are they libellous, indiscreet, or unnecessarily hurtful?
* Do they slander in any way people, peoples goods, or services?

Recommendations:

* Are the recommendations clear? Are they itemized (where possible)?
* Are they justified by the findings and the conclusions?
* If there is an attractive course of action to the one proposed, has it been stated, and have reasons been given for the chosen recommendations?

3.914b **Expression:**

* How well has the message of the report been expressed?
* Are there any unusual words, phrases or abbreviations which readers may not understand?
* Have any long words been used that could be replaced by short words without sacrificing the meaning?
* Can any of the adjective or adverbs used be deleted without lessening the force of a statement?
* Have technical terms been defined, where necessary?
* Are paragraphs length suitable for the material and the readership?
* Are statements linked correctly to avoid ambiguity?
* Is the report in the active rather than passive?
* Is there any lack of agreement between subject and verb?

3.914c **Punctuation:**

Checking punctuation requires a separate reading of the report to spot the errors and inconsistencies.

3.914d **Layout:**

* Is the title page clear, attractive, complete and well laid out?
* Does each major section of the report begin on the right hand page (recto)?
* Has the numbering system been consistent?
* Is the margin wide enough on recto or verso (left

hand page) to allow for binding?
* Is the spacing between the lines adequate?
* Has the classification scheme been followed
  meticulously?
  - Are the sequences correct?
  - Are the margins or indents consistent?
  - Are the headings correct both in size and
    position?

3.915   **Conclusion:** It is, difficult to prescribe a hard
and fast formula for collecting information, analysis
and interpretation, packaging and report writing. The
checklists of questions, guidelines and other questions
included in the various sections of this chapter are
intended to stimulate the thought process of the
researcher. In so doing, it is expected that the quality
of information gathering, analysis and interpretation,
and report writing will greatly improve. These
guidelines will alone not improve the quality of a
report if the terms of reference and survey instruments
are badly designed and the researcher is not skillful in
his literary abilities.

Client Needs: Selected reading for more study

Ackoff, Russell L. **A Concept of Corporate Planning**. Wiley — Interscience, 1970.

Ansoff, H. Igor. **Corporate Strategy (An Analytical Approach to Business Policy for Growth and Expansion)**. Penguin Books (Copyright MacCraw Hill 1965, 1968)

McCarthy, E. Serome. **Basic Marketing: A Managerial Approach.** Richard D Irwin, Inc. Third Edition, 1968.

CHAPTER IV

MARKETING OF R&D OUTPUT AS AN ASPECT OF CONSTITUENCY RELATIONSHIP

MARKETING OF R&D OUTPUT AS AN ASPECT OF CONSTITUENCY RELATIONSHIP

Training Objectives

By the end of this section, the participants will be able to:

1. Identify and classify the various RDI output

2. Define marketing in relation to R&D output

3. Identify some constraints in marketing

4. Prepare a project information sheet

5. Define commercialisation of R&D output

6. Identify institutional tasks for the successful commercialisation of research results

7. Describe some national mechanisms for promoting commercialisation of domestic technology

8. Explain the role of the productive system manager and entrepreneur

9. Describe the importance of government intervention and planning

MARKETING OF R&D OUTPUT AS AN ASPECT OF CONSTITUENCY RELATIONSHIP

Contents

All this material can be covered in one session provided it has been studied on an individual basis prior to the session.

MARKETING OF R&D OUTPUT AS AN ASPECT OF CONSTITUENCY RELATIONSHIP

4.111   **Introduction**: Research and Development Institute's quantity, quality and significance of output is related to quantity and quality of inputs consisting of the various resources such as manpower and finance. It also includes environmental demand and support. The inputs are generally inadequate in most developing countries. The RDI usually has to use these scarce resources to achieve results. One of the important ways of evaluating performance is the commercialisation of R&D output.

4.112   RDIs are **service institutions** whose output are products and services needed by various productive subsectors, government institutions, policy makers, individual entrepreneurs and farmers. It is therefore necessary that they effectively market their products and services to justify their existence and contribute towards national growth. Experience has shown that translating research results into productive units of systems is an important but difficult task for research institutes in general.

4.113   RDIs in developing countries, however, have more problems to encounter in commercialisation of their research results because of the lack of confidence, venture capital, and entrepreneurial and managerial skills. In such circumstances, a research institute has to perform a number of tasks to ensure success in commercialisation. The tasks include; technical research, feasibility study, demonstrations, promotion, market testing, training and often plant design, fabrication, installation, commissioning and extension services. Marketing in the context of RDIs may be considered as the management function which organises and directs research involved in assessing

and converting client need into effective demand for a specific product or services, and in moving the product or service to the final user so as to achieve the objective of commercialising research results.

4.211   Research and Development Output: Research and development institute's output can be considered to be the **technology of scientific know–how included in services, products processes and methodologies.**

RDI outputs can be classified into four categories, namely:

*   Scientific knowledge
*   Testing, analytical and consultancy services
*   New or improved devices, products and material
*   New or improved processes and methodology

RDIs can also sell ideas which may generate output such as a proposal to construct a research institute.

4.212   Testing, analytical and consultancy services are generally provided to clients by the institute on request. The services include provision of information; feasibility studies; technical trouble shooting; and analysis and testing for quality control purposes; for these services the institute can utilise normal publicity channels to ensure that a large number of potential clients know of the nature of facilities and capabilities of the institute and the costs for providing such services. Publicity channels include radio, television, newspapers, journals, letters to clients and personal communications. Costs, efficiency and speed with which the institute provides these services will be crucial to the attraction and retention of customers.

4.213   Product development or material identification is generally done by an institute as a result of a request from a client, in which case any results of the research are presented to the client. An RDI then only needs to follow–up through extension services to solve any problems which might arise during implementation. A research institute may in certain cases develop a product or a material without having a specific client in mind. This happens when a scientist develops an idea related to national development goals and falls within identified institute programmes or as a result of a follow–up on an interesting lead while working on a given project. The translation of such results into commercial products requires much more inputs from an RDI.

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4.214   Process and methodology development can similarly arise from contracted research or programmes identified from national development goals and through the scientists initiative, ingenuity and genius. Both sets pose the same problems as with product development but are in our experience more difficult to market and commercialise. It will be noted here that although in some quarters it is stressed that RDIs should concentrate on client sponsored research projects we propose a blend of three sources for projects; that is, national development goals as identified by suitable committees, client sponsored, and those identified through scientists creativity. All projects from the three sources have to be vetted and approved in accordance with established institute vetting systems to optimise allocation of institute resources; and gauge possibilities of success and impact.

Exercise 4.1 Enumerate specific output from your institute and name the relevant clientele.

4.311   Marketing is generally considered as a set of activities in R&D marketing of results and refers to passing on the product to users in most favourable terms which facilitate exchange of needs. There are in essence three important elements in the marketing concept. We have already identified one of the elements i.e, an output. The second element is the RDI or the marketer. The third element is the recipient of the output or the client.

4.312   **Marketing of R&D Results:** In Chapter II and III of this Manual the various clients of an RDI have been considered, namely, final users of R&D results (public entrepreneurs and farmers); and the various middlemen (retailers, media, peer group and decision makers). It has further been shown how the client needs can be assessed and determined. Through this process the RDI formulates a project, plans, executes and develops a process, product or service that will satisfy identified client needs. The institute sets a price on its output; promotes and sells it to clients; and receives feedback information on the performance of its product for subsequent improvements. If this cycle is followed in an ideal situation the marketing function is simple and corresponds to modern business principles.

4.313   It is important to note that marketing invariably starts and ends with the consideration of the needs of the client. This orientation does not negate the principle enunciated above on initiation of projects. Needs can be gauged through national consensus in the form of national plan; by scientists working on particular projects or by expressed need of a particular client.

Exercise **4.2** Name projects in your RDI and categorise them depending on how they were initiated.

4.314   Most RDIs in reality find that marketing activity is not so simple and a number of research results are never taken up by clients.

4.315   An RDI as the marketer has to perform the following functions:

*   Assessment and determination of client needs;
*   development of process, product or service;
*   pricing;
*   promotion and delivery;
*   satisfaction of clients; and
*   extension services and feedback.

The first two activities have been adequately discussed in other chapters of this manual. Pricing and promotion will be considered here as marketing activities; while satisfaction of the client and extension services are considered as commercialisation activities. It is further to be noted that assessment of needs is also a marketing activity.

4.316   The institutional framework for performing marketing activities differ with the size of RDIs. Small institutions may only depend on the management for marketing while larger institutions will have marketing information and marketing research units which will include a solid scientist in order to assess needs, price, promote and deliver output.

What type of a marketing system does your institute use? How effective is it?

4.317   Most research institutes in developing countries financed by the governments do not operate strictly on a commercial basis. Their outputs are priced in different ways to reflect the government subsidy. In some cases products and services are provided to clients free of charge or at a nominal fee. A few research institutes are self supporting and base their pricing policy on a balance between supply and demand or on actual research costs. Pricing of RDI output will have a marked bearing on the demand for its output especially in countries where capital is scarce.

How does your institute price its output?

4.318   The marketing concept also relates to the image of the whole RDI and therefore is a function of historical institutional development; management; quantity; quality and significance of output; and psychological and socio–economic factors. An RDI's image is both a function of external and internal factors. Generally the environment in which an institute operates affects its image and to some extent

determines the acceptability of its results. In
developing countries industries and entrepreneurs
have very little confidence in local R&D and are
reluctant to take risks but will readily purchase proven
technology from abroad. The cultivation of confidence
depends on the historical development of national
industries; and the institute and its consistency in
giving good results.

*Do potential clients readily
seek services of your institute
and accept its output?*

4.319   Demand for RDI results is influenced to some
extent by market forces. Market forces are however
normally distorted by fiscal policies. Demand for R&D
results, for example increases when the government
reduces the supply of foreign exchange to purchase
foreign technology or raw materials. In one country,
when foreign exchange was not readily available, a
battery manufacturer approached an RDI to design a
galena sintering plant for production of lead which
hitherto had been imported.

4.320   Despite these external influences, the RDI has
to perform the most important function in marketing
the promotion of its output. Promotion can be
considered as methods for stimulating demand. In
certain institutions this function is handled by an
appropriate officer. Promotion can be divided into
personal and impersonal promotion. Personal contacts
with industry and entrepreneurs are very useful in
marketing research results. Personal contacts which
include extension services, seminars, workshops are
better done by scientists or the director of the research
institute. Impersonal promotion is basically
advertising in print and the media.

4.321   Some RDIs have devised what are known as
process or product information sheets which are
distributed freely or on payment of a nominal fee. A
process information sheet should contain as much
information as possible excluding patentable material,
to interest a client to approach the RDI for assistance.
A process information sheet used by an RDI to
advertise its process for manufacture of cashew apple
juice had the following elements:

*   Product and by-products
*   Product consumption pattern
*   Market information
*   Process in brief
*   Equipment
*   Project Economic
*   Special features of the terms of release

Exercise 4.3 Prepare a process information sheet using the above headings and provide the relevant information on a process developed by your institute.

4.322   Some RDIs send circular letters to industries showing the services they can offer. An example letter used by one of the RDIs has the following headings:

*   The Institute
*   Location
*   General facilities
*   Statutory functions
*   Organisation of research
*   Services to manufacturers, farmers and
     entrepreneurs
*   Specific facility
*   Specific services provided
*   Sample submission and analysis
*   Project submission, contract and execution
*   Analytical and project reports; and charges
*   Contact point

Apart from these types of letters, institutions usually have brochures, annual reports and project reports which are normally made available to interested parties.

What advertising methods does your institute use and how effective are they?

4.411   **Commercialisation of R&D Results:**
Commercialisation of a product, process or service may be considered as its acceptance and usage on a large scale. It connotes a satisfaction of a constituency need. Commercialisation of R&D output is the translation of research results into productive units or wide usage to solve clientele problems. Although it may be considered in some cases as part of marketing,

it is used here to distinguish between promotion and selling/buying on the one hand; and actual wide application and usage on the other. For example, an entrepreneur may buy a project feasibility study but never implement it into a productive unit. A farmer may buy a new high yielding variety of cereal seed developed by an RDI and only plant it for one season and abandon the project as a result of some specific problem requiring further research, Such results cannot be considered to have been commercialised.

4.412   Successful commercialisation of research results is both an RDI and a national task. At the institutional level it must start with the marketing concept of accurately assessing the constituency needs. RDI must set up mechanisms for studying technological development trends in its constituency and also develop long–term industrial, energy and trade policies in the context of the industrial structure, consumption patterns and social and environmental conditions and be able to take action oriented measures within the overall system. On the micro–level the handling of individual projects to give a complete techno–economic picture helps greatly in commercialisation.

4.413   Some institutions have set up economic studies divisions to work together with technical divisions in conducting pre–feasibility and feasibility studies. The latter is strictly done on the request of a client. A feasibility study should incorporate the technology, engineering and economic appraisals including market analysis, financing and cost benefit analysis. Entrepreneurs normally want complete technological packages. It is important that after such studies are done the RDI follows closely and continues advising during the implementation of the project.

Problems usually arise at this stage which may necessitate changing certain assumptions and conclusions. The technical divisions also need to be closely involved with the designing, fabrication, erection, commissioning and monitoring of the performance of the plant or product.

4.414   Demonstration units are an important RDI activity especially in developing countries where there is lack of confidence in domestic technology. These units also act as training grounds for managers, practitioners and operatives. A research institute normally sets up these units as pilot plants or small

scale prototypes to demonstrate the efficacy of a given technology and to conduct further engineering research and market studies. Some institutions set up complete plants or units, based on research results, to the required economic scale, operate it and sell it to an entrepreneur or accept equity participation from interested parties.

4.415   An RDI is just one of the sub-systems involved in the commercialisation of technology. Active commercialisation of domestic technology requires a supportive policy environment to be effective. Policy and fiscal measures which encourage indiscriminate imports of packaged technologies and the exports of commodities with very low added value are counter productive to the effective contribution by RDI to the commercial sector. The government and the community have therefore an important role to play in the commercialisation of RDI output by providing the correct policy environment; market linkages; insurance and subsidised risk finance; management and entrepreneur training; and fiscal and infrastructural incentives to the domestic technology recipient.

4.416   One of the mechanisms through which the commercialisation of R&D results can be enhanced is the creation of a fund for technology delivery. This fund may be created by voluntary or statutory contributions from industry. In the agricultural sector a cess on farm produce is normally applied and directed to the appropriate research institute. In this way the farmer demands that such an institute should solve his immediate and long term scientific and technological problems. In the manufacturing sector an industrial research levy exists in a number of countries. In some developed countries sub-sectoral research associations are formed and individual members contribute to research funds according to formulae based on sales or profit. Financial linkage between an RDI and users of technology tends to make the RDI more productive and the industry more willing to take-up its research output. It is possible to provide tax incentives to industries which contribute directly or through contracts to research funds.

Case 4.1: In Kenya national sub–sectoral or commodity research committees have proved to be extremely useful tools in defining research direction for RDIs and in the utilization of research results.

The National Sorghum Working Group is a committee which is currently spearheading and directing research on sorghum and millets. Its members are drawn from relevant research institutions in Kenya including the Kenya Industrial Research and Development Institute (KIRDI) which acts as the secretariat. The Ministry of Agriculture and Livestock Development chair the group meetings. Other members are drawn from the National Cereals and Produce Board (NCPB), millers, bakers, Kenya Seed Company Ltd. and farmers. This is a national research programme which was identified as a result of the national food policy and the possibility of extending cereals food crop acreage into semi–arid areas. The agronomic research stations in close collaboration with KIRDI conducted research to develop high yielding varieties of sorghum which are nutritionally acceptable and can be processed easily. KIRDI has been conducting research on processing parameters, equipment, developing new foods and improving traditional sorghum foods. Apart from contributions on variety selection, processing parameters and equipment; a

new food product known as "Supa–mtama" was developed and test marketed for the benefit of entrepreneurs. The idea for this project was formulated by KIRDI, tested in the laboratory, a pilot plant assembled to produce a new product, and test marketed within Nairobi in conjunction with an established distributor with some limited promotional activities. Although the test marketing produced some positive results this product has not been taken over for commercialisation.

A number of questions still remain unanswered including a pricing policy for sorghum; uninterrupted agricultural production of the correct varieties; domestic manufacturing of processing equipment; acceptance by the related industrial community; and marketing feasibility studies on a national level or a wider subregion. Based on existing information on technical, marketing and economic pre–feasibility, an entrepreneurial or management decision has to be made to turn this product into a commercial operation. Meanwhile, KIRDI continues with conducting further studies; selling products from the pilot plant; and providing available information to interested entrepreneurs.

4.417   In any commercialisation process the role of the productive system manager or entrepreneur is pivotal. The RDI has to convince the manager or entrepreneur that the system he has developed works not only technically but also socially and economically; and that it will not unduly disturb his normal routine. Since national development goals and scientific creativity should of necessity originate from common environmental factors and problems, the gap

between the perception of the practitioner and the RDI should not be poles apart. The bridge is eventually the customer or the final consumer. Both systems have to plan strategically by asking which of the consumer's wants are not adequately satisfied by the products or services offered and which is the most economic technical way of providing the identified products or services. The RDI must therefore clearly identify its customers. The ultimate user of a product or a service is always a customer but not the only one. Taking the example of the "supa–mtama" project one can identify various customers, namely, the final user (housewife); the grocer; the distributor; the miller; or a new entrepreneur. An RDI has to have a clear perception of what all these ("demand–side" and "supply–side") customers look for and consider value through an organised marketing system with trained extension service personnel and scientific feedback systems. The person who takes the biggest risk is the entrepreneur or industrialist who has to make long–term investment on capital goods, etc.

4.418   For an RDI to be in "phase" with development in its constituency it has to have a well organised extension service and feedback systems to facilitate commercialisation of its output and create confidence. The agricultural extension agent has created an impact by transmitting scientific knowledge to the farmer and solving or noting his problems for transmission to the RDI. This type of arrangement needs to be institutionalised in industrial, medical, natural, social and educational science fields. The extension agent can perform the following functions:

* marketing
* surveys
* trouble-shooting
* training
* follow-up
* feedback

Some of these roles can be promoted by actual exchange of personnel for specified periods.

4.419   Commercialisation of a research output has been shown to be a complex activity requiring inputs from many sub–systems and is also dependent on a number of socio–economic factors. Some research institutes are therefore content to perform technical studies and patent results and leave the implementation to aggressive and motivated

entrepreneurs and industrialists. Developing countries' RDIs have no alternative but to engage in marketing their output if they have to create an impact and solve development problems.

Fig. 4.1   Model for commercialisation of R&D output
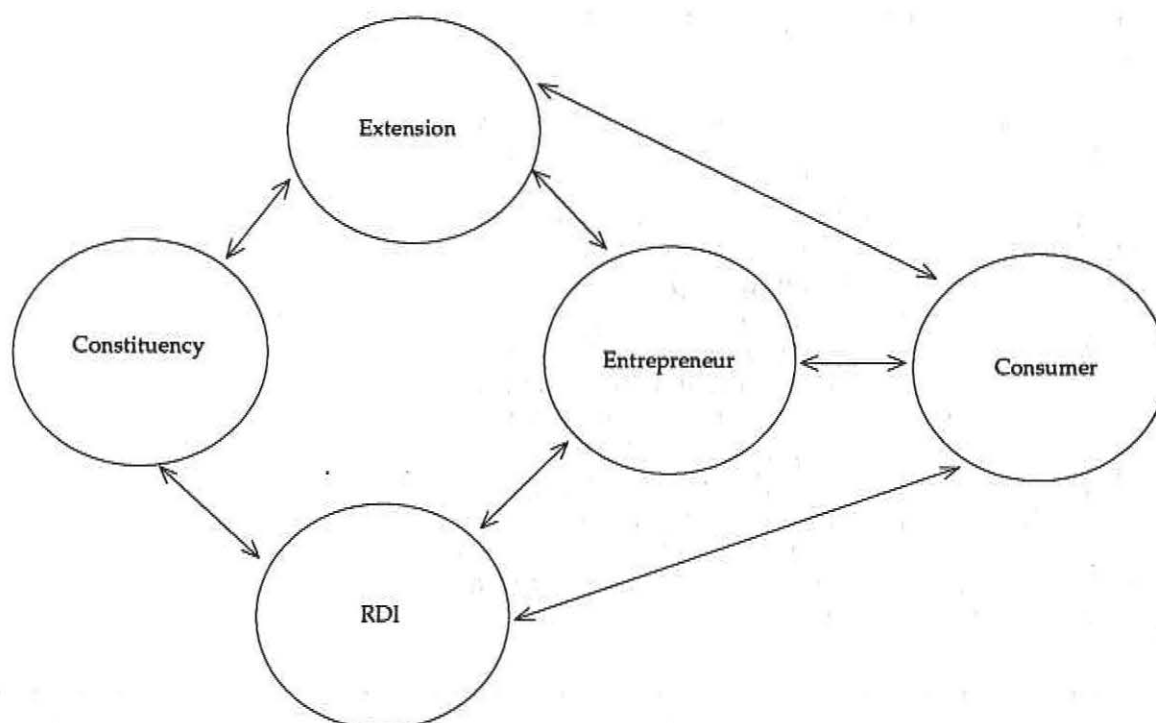
An attempt has been made to identify and define the roles of the various sub–systems in the process of commercialisation. It is, however, obvious from the "supa–mtama" case that in actual practice the system is much more complicated than the simplistic model. Athough many problem solving models place emphasis on the needs and wants of an individual, the RDIs major sub–system on the demand side is the entrepreneur but it has to create systems to monitor requirements on the supply side and other sub–systems on the demand side. In the last analysis the RDI sub–system is part of the overall national system whose performance when measured in terms of commercialisation of its output will reflect the performance of the whole system.

4.420   A successful commercialisation process in certain cases will involve a number of institutions in charge of specialised services. The RDI may only be in

a position to supply technical and technology information services. The entrepreneur interested in a new technology needs funds; management and marketing services; and government and community support to be able to set up a productive unit. Although the RDI can help the entrepreneur to secure some of these services, the complexity of the system is immediately apparent and may be beyond and unseasoned entrepreneur.

4.421   Some countries have proposed the setting up of technology delivery units to coordinate all these activities at the national level on behalf of the entrepreneur. The economics division of an RDI can be expanded to perform this coordination role. Subsidised venture capital should be provided by financial and development institutions at reduced interest rates to encourage entrepreneurs to utilise domestic technology. The government should provide support by training entrepreneurs and managers and also give support in providing land and fiscal . incentives for setting up producing units based on local technology and the community should be encouraged to buy local technology. The model which emerges is complex and may require the services of a seasoned technical design artist.

Exercise 4.4 Give examples of demand schedules by the public, peers, decision makers and entrepreneurs as constituents of your RDI.

Exercise 4.5 Give examples of output from your institute which have been successfully commercialised and highlight the strategic inputs.

4.422   Commercialisation of research results occurs at both the macro and micro levels. At the macro level it can be considered as a national process involving policy, educational, scientific and research institutions in the promotion of technology in the productive sector. The role of the government in this process is very important. It is however necessary for the RDI to appreciate the fact that it can contribute effectively to the direction of government policy. Some of the policy measures which are important to domestic technology commercialisation have been mentioned. The cornerstone for this process rests on a sound national industrial and technological policy based on optimisation of factor endowments.

4.423   The factor endowments include human resources whose scientific knowledge has to be increased to optimally utilize the physical resources. The government has to play a leading role in training and encouraging leader industries based on local technology. In this respect major decisions need to be made on the standardisation of processes, products, machinery, parts, practices, methodology and devices. Apart from direct financing of RDIs, suitable measures should be instituted to create financial linkage with the productive system.

4.424   **Conclusions**: The marketing and commercialisation of R&D output is an institutional task which is dependent on national policies and socio–economic forces. An RDI needs to establish clear systems for marketing its output, influencing national industrial and technological policies and contributing towards a dynamic socio–economic climate in which domestic technology can thrive.

Marketing of R&D Output: Selected reading for more study

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CHAPTER V
CONSEQUENCES OF AN RDI NEGLECTING ITS CONSTITUENCY

CONSEQUENCES OF AN RDI
NEGLECTING ITS CONSTITUENCY

Training Objectives

By the end of this chapter, the participants will be able to:

1. Understand the consequences of neglecting RDIs constituency

2. Understand ways of promoting good working relationship between RDIs and their constituencies

3. Identify possible conflicts RDIs have with their constituencies and know how to avoid or resolve them

CONSEQUENCES OF AN RDI NEGLECTING ITS CONSTITUENCY

Contents

All this material can be covered in one session provided it has been studied on an individual basis prior to the session.

CHAPTER V

CONSEQUENCES OF AN RDI NEGLECTING ITS CONSTITUENCY

5.111   Introduction: The consequences of an RDI neglecting its constituency are basically very simple. In the short run its work is likely to be misdirected, and in the long run it is likely to be closed down. These two consequences are of equal importance to an RDI manager. His main social and professional obligation is to do an effective job of using the R&D resources at his disposal to benefit the community as a whole, or some target group of "Final Users" of his R&D outputs. But he cannot do an effective job unless he stays in business, and he cannot stay in business unless he does an effective job. Thus, an ability to survive and to attract sufficient financial and constituency support for this purpose is one of the objective measures by which an RDI manager can measure his own success. Unfortunately, his background and training frequently do not condition him to think in this way. In the following chapter we will assume that the political and economic structure within which an RDI operates is such that adequate inputs and resources will be made available to it if it is well run – i.e. that finance is potentially available, and that there is no fundamental prejudice against R&D. We will, however, relax this assumption sufficiently to show that this is the only constructive working assumption to make, even in situations where objective phenomena cast doubt on its correctness.

5.112   The Contrast with a Political Model The idea of a constituency comes from politics as was pointed out in Chapter II of this **Manual**. However, It is worth comparing the perspective of a politician with that of an RDI manager. A politician usually has a "constituency" of people who vote for him. This is usually defined on a geographical basis. Within the constituency he has to compete for votes with other politicians. One might describe this as his "narrow

What is the difference between Constituency and client? List RDI clients in your Institute's constituency.

constituency". In addition, most politicians recognise
that they need to obtain the approval of many other
individuals and groups, who do not necessarily belong
to their narrow constituencies, if they are to succeed
and prosper in their profession. These may include:

*   a political party,
*   local support groups,
*   national interest groups and
*   the media.

5.113   The situation of the RDI manager israther
similar. Generally, he has no "narrow constituency" of
people who periodically cast votes to determine if he
should keep his job. However, his performance and
that of his RDI is subject to continuous assessment by
the "Final Users" of his R&D product who are roughly
equivalent to a group of voters. And, in addition, he
needs to satisfy a "wide constituency" of other groups
including politicians and civil servants. If he fails to do
so, then like the politician, he is likely to lose his job,
or at least will cause a decline in the fortunes of his
RDI.

*How does a RDI constituency
approve the institute's
performance?*

5.114   Thus, the politician and the RDI manager are
both professionals depending on different sorts of
"constituency groups" for their survival. However,
there is often a big difference between the way they
regard their constituencies. For the politician
management of his constituency relations is seen as a
central part of his work. If he does it well, he will be
admired for it by his colleagues. If he does it badly he
will quickly lose his job. The RDI manager seldom sees
constituency relationship in this light. He probably
regards himself as first and foremost a scientist, and
sees development of constituency relationships as
something which has to be fitted into spare time and
slack periods. He may be afraid that if he devotes too
much attention to constituency relations, his
colleagues will say "Dr X is really a public relations
man, not a scientist". Because the feed-back from his
constituents is slow and indirect, he may even feel that
he can ignore constituency relationships altogether.

5.115   The contrast between the attitudes of the
politician and the RDI manager is summed up in Table
5.1.

Table 5.1 How two professionals may view their constituencies

Politician	RDI Manager
Constituency relations seen as a central aspect of his duties	Constituency relations seen as a peripheral part of his duties
Effective cultivation of constituents seen as exciting admiration in his peer group	Effective cultivation of constituents seen as existing contempt in his peer group
Neglect of constituency expected to cause professional disaster	Neglect of constituency expected to have little immediate impact

This highlights some of the differences. The fact that R&D constituencies react slowly is both an advantage and a disadvantage for the professional:

Advantage – that he can correct a decline before it becomes a disaster;

Disadvantage – he may not notice the deteriorating situation or connect it with his professional performance.

5.211   What does it mean to neglect a constituency? For all RDIs, there are four aspects of "neglect". These are:

Give specific possible consequences of your own RDI negleting its constituency.

(a)   Failure to find out what the constituency wants.

(b)   Failure to do effective R&D which corresponds with what the constituency needs.

(c)   Failure to present R&D findings in forms which the constituency can easily use and understand.

(d)   Failure to let the constituency know that the RDI takes it seriously.

We shall concentrate mainly on (a) and (c), not because they are more important than (b) but because they are more neglected. Doing effective R&D is the most difficult and fundamental part of an RDI's work, but if it is not done successfully, no amount of constituency relation–building is going to save the

RDI. It is, however, important to note that
scientifically excellent work need not necessarily
correspond at all with what constituents want. One
may also note that if (a), (b) and (c) are successful, (d)
is often achieved fairly effortlessly. There is, however,
a danger with RDIs of appearing to "talk" down to
various constituencies.

5.212   The consequences of Neglect The effective RDI
manager realises that although he may be lucky for
short periods, neglect of any major constituency group
will eventually jeopardise the existence of his RDI. The
rapidity of the reaction will depend on the RDI and on
the constituency group, but the situation is summed
up simplistically below.

Constituency group	Consequences of neglect	Result	F or S
Final user	Misdirected irrelevant research output support	Slow erosion of grass roots	S
"Retailers"	Output fails to reach final user in correct form	Slow erosion of grass roots support	S
Intermediate RDI	Complaints to decision-makers and paymasters	Withdrawal of budget	F
Peer group	Poor output reaches final user	Slow erosion of final user	S
Decision-makers and paymasters	Incomprehension and dissatisfaction	Rapid erosion of budget	F
Public and media	Bad press	Rapid erosion of support at all levels	F
	No information	Slow erosion of support at all levels	S

* Consequences are classified as 'S' for 'slow road to disaster' and; 'F' for 'fast road to disaster'.

5.311   **Conceptualising the Constituency**: A first step for any RDI is to conceptualise and describe its main constituency groups as discussed in Chapters II and III of this Manual These will differ from one RDI to another depending on their products and the R&D structure within which they work. In general, however, one has the following groups:

(a)   Final Users: the people or institutions who are intended to derive material benefit from R&D

(b)   "Retailers" of R&D: institutions which take "raw" R&D findings and "package" them for delivery to the final user.

(c)   Intermediate RDIs: other RDIs that come between the RDI in question and the final user.

(d)   The Peer Group: RDIs doing the same work

(v)   Decision–makers and Paymasters: institutions which make critical decisions on R&D policy, or provide financial backing for R&D.

(e)   The Public and the Media: the general public, the press, television, radio.

Exercise 5.1 Participants should analyse the constituency groups of their RDI, or a named RDI with which they are familiar. As far as possible they should use the categories employed in the text. Briefly describe the"final user" in terms of numbers, types, level of knowledge, attitude to R&D, attitude to the RDI. Where constituent groups involve institutions (e.g. Ministries, other RDI's) the principal institutions should be named, and the nature of their relationships with the RDI should be described.

We will now look in more detail at these constituents, the consequences of neglecting them, and the ways they may be handled.

5.411   The Final Users — 'The Real Boss': In agriculture this is the farmer. In medicine it is the patient. In industrial research it will sometimes be the consumer of the project; more often it will be the industrial enterprise that wants to make its products more competitive. The Final User is often forgotten because he (or she) does not play a direct part in the management of an R&D institute. He may even be regarded with paternalistic contempt because he is less educated than the researcher. Where this attitude exists, it is profoundly mistaken. In fact it is the Final User who is, or should be, the master, and the R&D Institute that is the servant.

Who is your real boss?

5.412   The Final User may be uneducated, inarticulate and illiterate but the purpose of the R&D is to assist him, and if he is not satisfied, the word will eventually get down the line to the Decision-Makers and the Paymasters, and the funds will stop flowing. This happens fast in cases where the final users are the Paymasters and the Decision-Makers — for instance when a group of manufacturers directly commissions research. But the same happens, though more slowly, in other cases. For instance, if peasant farmers get no benefit from agricultural R&D expenditure, it will not be too long before the Minister of Agriculture gets to hear. Farmers groups or co–operatives may make representations. Middle-class farmers may complain that they are paying taxes without obtaining any service in exchange. Landless people may demand the redistribution of the "unproductive" land belonging to the research station, and the Ministry of Agriculture may realise that it is short of effective counter-arguments. Critical questions may be asked in Parliament.

5.413   Determining the Final User's Needs: The need to determine the needs of Final Users sounds obvious but it is often not done. For instance, agricultural R&D institutes in less developed countries have only recently started to show an interest in asking farmers what are their most important problems. Many still refuse to do so. Why is there this reluctance? It must be admitted that there are practical problems. It is difficult to extract a consensus opinion from a large population of users. However, a more fundamental problem is the arrogance of the

professional researcher who does not trust the Final
User to identify his own problems correctly. This may
be found whenever the researcher is more highly
educated than the Final User. (Many of us have
probably had similar problems when trying to explain
symptoms to a doctor!) It is usually a mistake.
Effective communication with the Final User is a
necessary condition of effective R&D. The researcher
may well have superior skills in deciding what
approaches may be used to solve a problem and what
problems are likely to give the greatest reward to
research effort. But the Final User is better at
perceiving his own problems, and also at deciding
whether the 'solutions' advanced by the R&D industry
really work.

5.414   A variety of practical methods can be used:

5.414a   Direct representation of the user group in the
decision–making process of the R&D Institute. This
works best when the user group is small, fairly
homogenous, and speaks — technically but also
literally — the same language as the R&D Institute It
works least well when the Final User group is large,
diverse and culturally and educationally removed
from the R&D researcher.

5.414b Statistical sampling of the Final User: This is
useful subject to certain conditions:

*   the sample must be statistically valid;
*   the right questions must be asked.

It remains an inflexible and expensive solution. A
statistical exercise often reveals more about the beliefs
of the person who designed it than about those of the
people sampled! Open–ended questions like "what are
your main problems" produce answers which are hard
to deal with statistically and which may be interpreted
differently by different people. Statistical
questionnaires are an aid to dialogue, not a substitute
for it. As the problems change, so must the questions,
and unless one already has a shrewd idea of the
problems, the questions will often be wrong.

5.414c Forms of dialogue: Direct representation in
decision–making is a form of dialogue. Other forms of
dialogue are "anthropological" investigations, like
those of farming systems research. These rely in the
last resort on an intelligent person asking intelligent

questions. But it cannot be done unless an intelligent R&D representative actually *meets* the Final User. It is not a job to be delegated to a second–rater or an inexperienced junior.

5.414d   Doing effective research: As has been said earlier, this is so fundamental an issue that it is beyond the scope of the present paper. However,one aid to effective research is to involve the Final User in the research process. Commonsense tells us that this cannot be done in such cases as highly sophisticated laboratory experiments, but it can be done with acceptably low risk to the collaborating final user in such cases as industrial product development or applied agricultural research. This is part of the theory of Farming Systems Research.

5.415   Presenting the Findings to the Final User
Unless the Final User receives the results of R&D in a form which he can understand and use, there is no point in doing research. Presenting results — and letting the Final User know what the RDI is doing — is also a vital aspect of a survival strategy. The methods to be used will vary from case to case. Possible strategies include:

Describe strategies used by your own RDI in passing its findings to the Final User.

*   direct representation on a management or liaison board (advantages/disadvantages already discussed);
*   open days;
*   visits to the Final User;
*   representation at shows;
*   brochures, (pamphlets)
*   "real–time" service – i.e. being willing and ready to answer phone–in queries and walk–in "customers", and advertise the fact;
*   use of media;
*   use of intermediate "extension" organisations (discussed separately below).

5.416   It is important to stress that there is no single strategy for all RDIs. The main thing is to *have* a strategy which relates to the sort of Final User you have and the sort of results you need to communicate. Let us look at two extremes.

Table 5.2 User categories and information required

	Type of final user	Possible information approaches
A.	Large manufacturers	
	Small number, easily contacted well educated	–visits –seminars –mail shots
B.	Small farmers	
	Large number, hard to contact low level of education	–radio broadcasts –local shows –literature distributed to schools

Another part of the "information job" which is often neglected is to let the Final User know where the new R&D results are coming from. This is part a legitimate survival strategy.

Case 5.1: The Final-User Neglect

In the semi-arid areas of country X, agricultural researchers noted that about every four years, a shorter than average rainy season led to widespread crop failure. After several years they perfected on the research station a farming system in which soil moisture was conserved on a quarter of the cultivated areas by maintaining a ploughed bare fallow. This area was then able to produce an adequate crop even in a short rainy season.

Farmers refused to adopt this system. When asked why they replied that the ploughing of bare fallow in the dry season was ruled out by lack of fodder near ploughlands, and the poor condition of the oxen. What they really needed were innovations that would allow them to plough and plant as soon as the rains came. This would also allow

them to get a crop from a short rainy season. In this case the RDI followed a logical train of thought. However, it failed to understand the constraints of the farmers who had their fields a few hundred yards from the research plots. These would have been able to suggest equally logical approaches which took their constraints into account.

5.511   The "Retailers" of R&D. In many cases a retailing organisation is interposed between the RDI and its Final User. This has some logic in that packaging information and passing it on is a specialised business. It also has risks:

*   it breaks the link between the RDI and its user;
*   it is a wonderful opportunity for passing the buck. The "Retailer" blames the RDI for giving it inappropriate information. The RDI blames the "Retailer" for failing to make use of information.

Your Retailer is a valuable ally and a dangerous enemy. He has skills and facilities that the RDI lacks, but like any distributor in any trade, he can destroy a good product by bad marketing. He also probably has the same paymasters and political masters as the RDI, and may compete with it for funds, so if he has a bad opinion of the RDI, it may suffer materially.

5.512   The best example of an R&D Retailer is probably an *agricultural extension service* which takes the responsibility for passing on the findings of agricultural R&D to farmers. This is also all too often a good example of the problems of losing sight of the needs of the Final User. Let us look at some common problems:

(a)   The downward flow of information is poor. The RDI is several years in arrears with its research reports, and fails to "package" information to meet the extension services' needs even though it may be years in arrears with publishing its results. The extension agency sees its role as passing on a fairly rigid set of "messages" to farmers — often laid down in extension manuals several years before — and fails to take the initiative in seeking new R&D results to incorporate in new extension messages.

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(b)   The upward flow of information is non–existent. Extension workers see their role as telling farmers what they ought to do, not asking them what they need. Consequently, they would have nothing of value to pass on to the R&D Institutes even if the latter were interested in listening (which they are often reluctant to do):

*   because they think they know best, and
*   because they do not want to disrupt their existing programmes.

5.513   There are three general principles for an RDI to bear in mind in its interaction with its Retailers:

Why are these principles important?

1.   Develop your *personal* contacts with your Retailer. Get feedback from him.

2.   Put effort into preparing material for your Retailer. Find out what he needs; develop a format and a timetable of meetings and information flows. *Do not* merely throw undigested scientific papers at him when the impulse seizes you!

3.   Do not lose touch with your Final User. If your Retailer is failing you, you need to know.

5.611   The Intermediate User. Some R&D Institutes have intermediate R&D users and cater to them rather than to Final Users — or as well as Final Users. For instance, the international agricultural research institutes of the Consultative Group for International Agricultural Research (CGIAR) have as their clients as the national agricultural research institutions. This is a fairly rare category in developing countries and the principles are essentially the same as those of working with a Retailer of R&D in that they:

1.   Develop personal contacts and get feedback with national RDIs.

2.   Find out what they need and prepare appropriate material for them.

3.   Do not lose touch with the Final Users — national RDIs.

5.612   In addition, national RDIs in recognising their capacities for productive R&D efforts should do the following:

*   divide up the work explicitly and rationally between "upstream" and "downstream" institutions;

*   if you are in an "upstream" institution use it to organise symposia, information exchanges, product exchanges etc *between* the downstream institutions. This will make you more productive *and* strengthen your position;

*   do not adopt an authoritarian or paternalistic attitude towards the downstream institutes.

5.613   Readers are requested to note that the terms "upstream" and "downstream" in relation to R&D are well–known, but are unfortunate in several respects. The implication that one type of research is "above" another is to be avoided. It must be remembered that in reality this "stream" should flow both ways! An upstream RDI's ability to assist a downstream one will depend on the information that it obtains from downstream. It is all too easy for a downstream RDI to complain it is getting nothing out of its upstream collaborator, when in reality it is itself putting nothing in.

5.711   **The Peer Group**: The peer group for an RDI consists of similiar institutes in overlapping fields, inside the country and out. They are your direct competitors for prestige, promotion and funds. They are also potential customers (and thieves?) for your findings. No–one's criticism is more spiteful and no–one's good opinion is more to be coveted. Because they have the same technical expertise as you, they can pose as objective critics. An administrator, or politician who wants to know if you are giving value for money is almost bound to seek the opinion of your Peer Group.

5.712   **Peer Group Relationship**: The following constitute significant elements in improving relations:

*   Make sure you know their work and they know yours.

*   Take the initiative in arranging visits,
        information exchanges, summaries of work in
        progress.

*   Publish.

Publishing is the traditional way of reaching the Peer
Group. It is important but not more important than
other forms of contact.

5.811   **Decision Makers and Paymasters:** Who
makes the decision whether your RDI should be
closed down, expanded, merged with another
institution? Who decides whether its priorities are
correct? Who decides on the size of your budget or
whether you even need a budget? Occasionally, these
decisions are taken by users who pay directly. In most
cases in developing countries, however, they are taken
in government ministries. Often the Decision–Maker is
a technical ministry and the Paymaster is a Ministry of
Finance or Planning (or even one ministry for the
recurrent budget and another for the capital budget).
It is madness to neglect this constituency which has
life and death power over your R&D Institute. But
many R&D Institutes do just this, and budget
committee at the national level have only the vaguest
idea of what they are being asked to approve. Better
media relations go some way towards solving this
problem, but if the person who determines your
budget has to rely on what he reads in the newspaper,
he is not being treated with the importance he merits.

5.812   A special category of Paymasters is the
international donor community. They are a major
source of R&D funding, but RDIs often fail to use
them simply because they are not prepared to meet
their requirements for information, carefully
documented funding requests, and project reporting.
The few R&D Institutes that are prepared to take this
trouble obtain a disproportinate amount of funding.
The "cost/benefit" for the RDI is often extraordinarily
good. $20,000 of high level staff time may bring in a
million dollars of funds! This is a constituency that
can rapidly repay attention.

5.911   How to Relate to Decision-Makers and Paymasters:

Some Guidelines:

*   Identify who makes the decision and the subordinates who brief the decision–makers.

*   Treat them as important. Ask if you can give them a briefing session in their office *before* crucial decision–making periods. Invite them for guided tours of your institute and a briefing session with staff.

*   *Do not deluge* them with professional papers which they will not read. *Do* prepare short briefing notes on programmes, results and budgets.

5.912   The Public and the Media: Ignore these at your peril! The public is usually the Paymaster and Decision–maker of last resort, and his views matter to the immediate Paymasters and Decision–makers. The views of the Public, the paymasters and the Decision–makers are strongly influenced by the Media. Get your Media relations right and you are well on the way to solving your problems with your other constituencies. You need the Media but remember that the Media also needs you. In developing countries the media are always short of interesting "copy". If you can prepare it or help them to get it easily, they will often use if. You can use them to:

*   provide information on what you have to offer; and
*   stimulate feedback on what the users need and how they view the RDI's contribution.

5.913   Positive Attitudes to Constituency Relation Failure:

All managers have to deal with "failures" – i.e. situations that did not turn out as intended. An RDI manager may experience such failures in his constituency relationships. Examples here range from a hostile press article, to a cut in the RDI's budget. These may or may not be the fault of the RDI manager. For instance a budget cut may result from a change of personnel in a "Paymaster" organisation, which gives influence to an individual who dislikes anyone with a Ph.D.

5.914 It is important in a failure situation to take a positive attitude. Three principles generally apply:

* recognise the failure;
* analyse its causes and
* put yourself at the centre of a strategy to minimise damage and prevent recurrence.

Recognising a failure is important. Some RDI managers are reluctant to do this, because it hurts their pride or they are afraid they will draw attention to their own shortcomings. Their attitude prevents corrective action being taken, and seldom goes unnoticed by others. Equally unhelpful in such cases are panic, public self–criticism, and attempts to find someone to blame.

5.915   Analysing the causes of failure is the next step, and must be done as objectively as possible. It involves both identification of causes *outside* the RDI (e.g. budgetary shortfalls, disputes between policy–makers and paymaster, or personal antagonisms) and causes *within* the institution (e.g. failure to present the RDI's case effectively to a particular constituency).

5.916   Lastly, the RDI manager has to put himself at the centre of a strategy to minimise damage and prevent recurrence of the failure. This willingness to take personal responsibility is of the essence of effective management, and applies equally whether the causes of the problem are external or internal to the RDI. It is *not* the same as taking the blame for a failure. The cause may be simply that "Minister Y failed to get a place at university and dislikes anyone with a degree"; even if that is the case, it is not sufficient to shrug off the problem as beyond solution. It may be possible to demonstrate to Minister Y that an effective RDI under his patronage is a powerful means of advancing his reputation.

5.917   Conflicts of Interest between Constituencies. With a wide constituency you run the risk of conflicts of interest. For instance, the farmer may be most concerned about increasing the place of cereal crops in his rotation, and the stability of cereal yields, because roughly every third year his family is acutely short of food. The Ministry of Agriculture may believe that agroforestry is the top priority, to fight soil erosion. The Ministry of Finance may want to concentrate all efforts on cotton because there is a foreign exchange

shortage, and cotton is the only reliable export crop in the system even though it is so unprofitable to farmers that most of them refuse to grow it. Meanwhile an overseas donor agency may offer to double the research budget of the RDI if it will mount a major programme on women's vegetable plots!

5.918   We can distinguish two main potential areas of conflict:

*   over the RDI's allocation of its resources between different programmes and

*   over the resources to be made available to the RDI in competition with other RDI's and other non–RDI users.

With regard to the first set of conflicts, it is inevitable that different parts of the constituency should have different priorities, because they in turn have different aims and different constituencies to serve. In their own terms they may each be right. In the example given, the farmer rightly has no interest in a pattern of agriculture that does not allow him to survive; the Ministry of Finance is correct to point out that without foreign exchange all institutions including the RDI will have their operations imperilled; and the Ministry of Agriculture is right to object that it will have failed in its mission if it permits the long–term destruction of the country's agricultural potential. The essence of *national policy* is to reconcile such conflicting interests.

5.919   There is no general solution to such conflicts of interest. They are not purely economic and technocratic questions which can be solved by handing them over to an economic planner and telling him to do a cost–benefit analysis, nor are they soluble through the price mechanism. In this situation the correct approach to ask is "what is the sensible course of action?'" rather that "what is the correct solution?" One also has to recognise that the "solution" will inevitably be a compromise between the different interests, and that the nature of the compromise will change over time. An RDI is not ultimately or solely responsible for national policy on anything, including its own research priorities or budget. If it tries to exercise such responsibility it will probably (and rightly) be firmly put in its place, and may suffer for its presumption. However, it does share a responsibility with its constituencies and even with national decision–making structures like elected

national assemblies, because it has knowledge and perceptions which are not fully shared by other constituents, and if it fails to participate, decision will be taken on the basis of partial information.

5.920   One of the most important things an RDI can do to reconcile conflicts over its priorities is to provide good information to its constituents – i.e. to maintain good constituency relationships. Another is to encourage *dialogue* between the constituencies. As the centre of the conflicts, an RDI is well–placed to act as organiser of such dialogue. For instance, many international agricultural research centres organise "advisory boards", "donor committees" and "expert advisory groups" at which different major constituents are represented. For instance they can influence the proponents of women's vegetable plots to listen to the views of the proponents of agroforestry, and at least may convince them of the practical difficulties of following one strategy to the exclusion of the other!

5.921   The other area of conflict is over the RDI's share of resources. Again, it has to be recognised that an RDI is not primarily responsible, and is likely to be biased in favour of its own survival and expansion. However, it will be competing with other contenders for resources. In general, therefore, it is more valuable for an RDI to act as an effective arbiter of its own interest than for it to try on its own to reconcile the interest of the different bodies contending for the resources.

Exercise 5.2 Course participants should describe from their own experience a situation of conflict of interest between RDI constituents, the way this was actually resolved, and a possible alternative strategy for resolving this conflict.

5.922   **Conclusion:** Earlier Chapters have given details on how to work with the RDI constituency. The real point of this Chapter is to impress on the reader that it is a matter of vital interest, both in terms of targeting the R&D work, and in terms of staying in the R&D business. It is not a demeaning or peripheral exercise. It is worth devoting time to it and spending money on it.

Consequences of Neglecting the Constituency:
Selected readings for more study

Bryant Kearl (Ed). **Field Data Collection in the Social Sciences.** Experiences in Africa and the Middle East.

Elon Gilbert, David; Norman, D; Winch, F. **Farming Systems Research: A Critical Appraisal.** Michigan State University, Dept of .Agricultural Economy, 1980.

Collinson, M. **Farming Systems Research in Eastern Africa.** International Development Paper No. 3, Department of Agricultural Economy, Michigan State University, 1982.

CHAPTER VI
R&D INSTITUTE EXTENSION SERVICES

R&D Institute Extension Services

Training Objectives

By the end of this chapter, the participants will be able to:

1. Understand the role of extension services in RDI Constituency relationships

2. Understand some of the processes by which extension serves RDIs and their constituencies

R&D Institute Extension Services

Contents

All this material can be covered in one session provided it has been studied on an individual basis prior to the session.

CHAPTER VI

R&D INSTITUTE EXTENSION SERVICES

6.111   Introduction: National as well as international and regional RDIs are engaged in research investigations to generate information, technology and **skills**. These institutes must have mechanisms to convey, deliver and disseminate their products to actual and potential users, and for maintaining linkage with their clients. This requirement is usually accomplished through extension services which serve as a bridge mechanism; allowing two- way flow between R&D information generators and users of that information. Thus, extension services can be perceived as an **information transfer mechanism.**

Are there any other products generated by RDIs?

6.211   Definition: R&D institute extension services refer to the institutional set up or mechanism established to accomplish the task of diffusing research products or disseminating them to intended users: Extension activities are the functions performed to accomplish any of the objectives of the extension service. The impact of any R&D extension mechanism depends on a number of factors which include knowledge of user needs, timely availability to the user community of desired products in appropriate and comprehensible form, how well the products are received and applied, maintenance of flow of the products and feedback from clients.

What is R&D Extension Service?

The ultimate success of the R&D extension process, therefore, requires:

1.   Understanding of user circumstances;

2.   Availability in the extension process of:

Are these the only requirements for the success of R&D extension process?

*   effective human and material resources e.g. organized manpower, materials, finances, infrastructure;

*   appropriate knowledge, information and technology and the skill of their application;

3. Appropriate environment: positively effective policies, stable political atmosphere, social acceptability and society readiness.

6.311   The importance of extension to R&D: Scientists, using the scientific method, produce knowledge by conducting basic and applied research. Scientific knowledge is needed to provide full or partial information to define or otherwise suggest possible solutions for user problems or for the development and packaging of technology. R&D institutions are responsible both for knowledge production and for knowledge management. The latter process ensures that research products are effectively linked with product users.
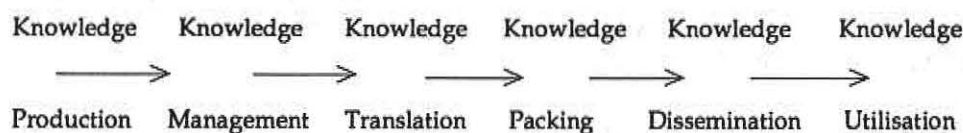
Why is R&D extension service necessary?

6.312   The term "research product" is used to define a broad range of research commodities including hardware and material as are products of industrial research; and software "products" as contained in research reports, scientific papers, information packages, research information, brochures, skills and feedback scenarios.

6.313   Knowledge, information, and technology production and their management processes include identification of users and user needs, and packaging and communication of results to users. These processes sometimes involve the synthesis and conversion of scientific research findings into information useful to and usable by target groups. At the technology packaging or product development stage of R&D institutions, research results are verified in relation to identified user needs, packaged in appropriate usable forms, transferred to disseminators or real users and finally their performance at user level is evaluated for their appropriateness.

Who is responsible for these elements?

6.314   The process linking R&D product generation with product dissemination and product utilisation is an indispensable extension system in which products generated by scientists are systematically incorporated into the design, production, adaptation, dissemination and use of user system to meet client needs. Thus, the model of product generation/product utilisation may be presented as follows:

Knowledge	Knowledge	Knowledge	Knowledge	Knowledge	Knowledge
⟶	⟶	⟶	⟶	⟶	
Production	Management	Translation	Packing	Dissemination	Utilisation

6.315   R&D institute extension systems serve another useful purpose of evaluating utilisation of the institutional products. Their communication mechanisms help in monitoring and feeding back to the R&D institute such information as:

*   technical, physical, economic, social and political feasibility of the products;

*   efficacy of the institute's product transfer mechanism/ system;

*   assessment of the socio–economic and other environmental consequences of product use; and

*   additional special skills and knowledge required by user groups and compatibility of the products with user expectations, user values and past experience.

6.316   Institutional requirements for refinement and for facilitating dissemination and diffusion of R&D products are determined through feedback from user groups by institutional extension systems; thus allowing further adjustments and improvements on R&D product development system. Fig 6.1 presents an action flow model for R&D Institute Extension System indicating a network of action points and link–directed responsibilities of R&D institutions in evolution and verification of research products and their diffusion.

6.317   The RDI Extension Service aims at providing constituency with a finished research product. The research product is a result of R&D effort to provide solution to an identified problem or investigate the fundamental principles of a conceived idea. To perceive a problem in the problem solving research, inputs from both research and extension institutions is essential. The development of hypothesis is considered a professional duty of research scientists eventhough extension agents play a useful role in suggesting possible alternatives. Ideally, the development of research objectives should be a joint responsibility to ensure that they embrace the needs of expected target groups which the extension agents know better.

Why is this necessary?

Fig. 6.1: Action Model for R&D Institute Exension System
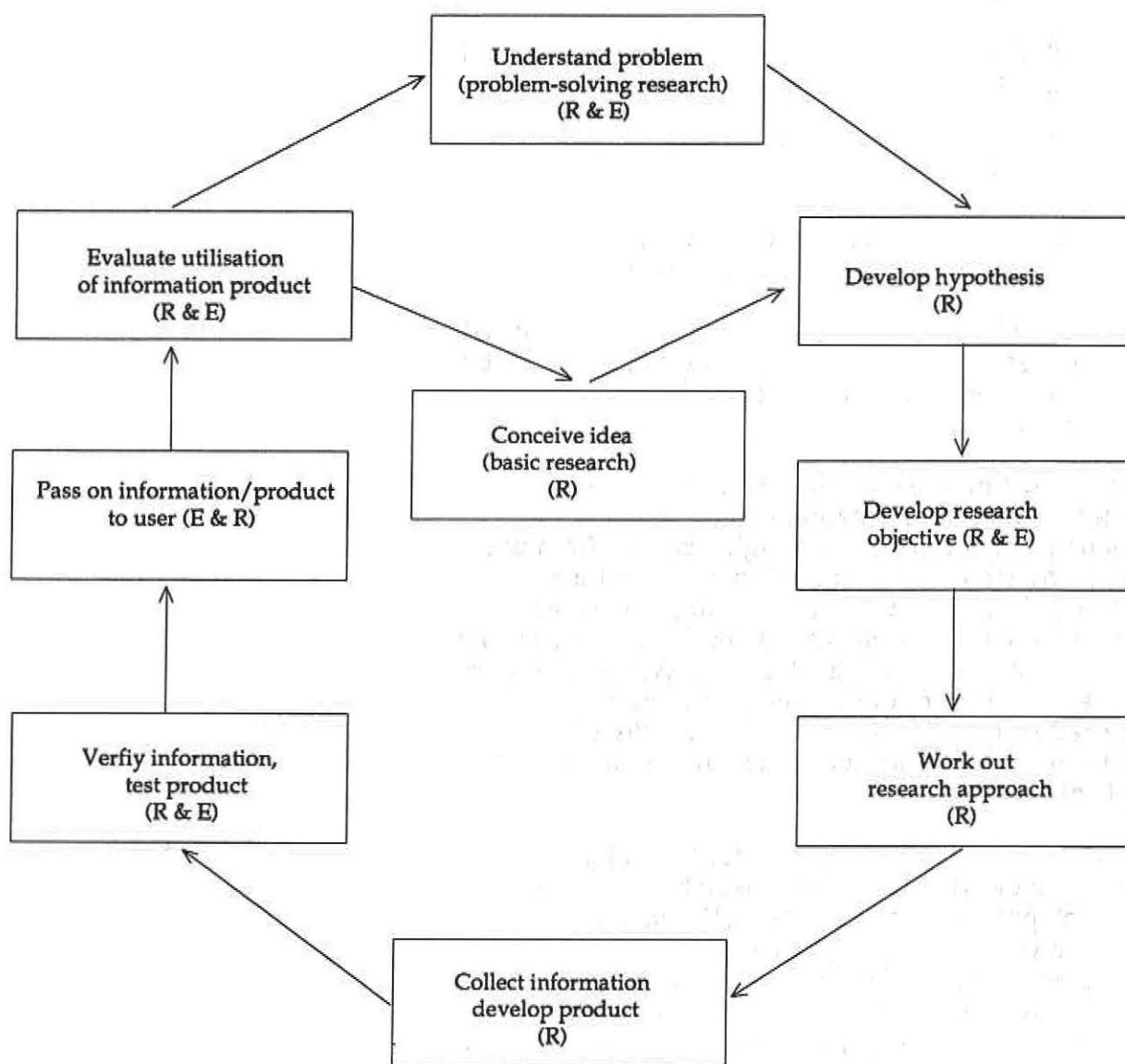
Legend:

R = Research responsibility;
R&E = Joint Research and Extension Responsibility with Research lead;
E&R = Joint extension and research responsibility with Extension lead;
Extension = Information/product transfer system;
User = Target group.

6.318   Planning of the research process, collection
and processing of the research data and, indeed, the
development of the research product are considered
the domain of RDI scientist. However, in the case of
verification of research information and testing the
RDI products, research and extension personnel must
jointly undertake the exercise with research providing
the lead. This is essential because of the necessity to
examine together the efficacy and practical
acceptability of the product in accordance with the
original jointly developed objectives and any other
observed factors during the development of the
research product. Equally, RDI agents must
participate in the exercise of passing on the
information to product users because of their capacity
and ability to explain the principles and details
concerning their products. They must maintain
interest, and in fact provide the lead in the evaluation
of their product and the extent of utilisation of their
information, knowledge and technology. This exercise
assists in further understanding of the problems and
facilitates conception of new ideas.   .

6.411   **Management of Extension Work by RDIs:**
The products of RDIs are varied. They range from
knowledge, information and packaged technology to
physical material, proven techniques, research
methodologies, procedures, skills and attitudes. These
products are useful to and demanded by diverse sets
of audiences. The scientists who produce them are
both information producers and information
consumers. They are constantly looking for new
knowledge and information to update their own and
to enrich their own understanding. Exchange of
information services to cross-fertilise ideas and helps
to reduce the knowledge gap among them.
Educationists, too, benefit in a similar way from new
knowledge, information and technology. While on the
one hand the products of R&D systems provide a basis
for better planning in the public and private sectors
and are thus demanded by planners and policy
decision-making organs, they are, on the other hand
deemed to be major support components in product
design and product development in industries, in
R&D performance and performance evaluation, and in
the application of science and technology. It is for
these and similar reasons that R&D institutions must
evolve extension systems to ensure diffusion and
exchange of their products.

*What R&D products may be
extended?*

6.412   If successful R&D products are to be
effectively extended to user groups, (a) the users and
the conditions under which they use the products
should be the key variables upon which R&D focuses,
(b) problem focus should be defined and the R&D as
well as extension service be organised to respond to
that challenge, (c) in addition to R&D information and
technology, there are other important and essential
requirements which must be carefully considered and
included in the extension effort. These include
education, inputs, market outlets, social and cultural
factors, (d) the involvement of and effective interaction
between researchers, users and extension agents in the
extension process must be given sufficient attention.

*What other considerations
must be taken into account?*

6.413   R&D institutes should have institutionalised
extension services charged with sifting research
findings, identifying appropriate innovations for
dissemination to users, packaging the information and
passing it on to other extension systems and users. The
institute's extension service must ideally be equipped
with adequate knowledge of the institute's activities
and communication skills that enable it to interpret
research information correctly and communicate it
effectively to target users. This information and
technology transfer process is often fulfilled by
transfer agents other than the institute's product
producers. The transfer agents may include staff of
other extension systems; product dealers such as
consultants who constantly need research information
to advise their clients, and dealers in industrial
products who promote their business by introducing
new products; cooperative institutions, suppliers of
inputs such as pesticides and fertilisers; teaching
institutions, administrators and funding agencies.

6.414   Different audiences can best be addressed by
specific agents. Thus R&D information producers and
extension staff of ministries of agriculture will act as
better communicators of R&D products to national
planning institutions, and decision making organs
while the public is best served by intermediate
extension agents, produce dealers, cooperative
institutions, administrators and suppliers of inputs.

What specific agents?

*Do they need different
approaches?*

6.415   Because of the number of transfer agents
involved and their diverse interest and background,
coordination and unified approach among them is
essential to ensure correctness of information,
technology package disseminated as well as
uniformity of the product.

6.416   It is natural to expect that various participants in the R&D extension will play different roles. These may be summarised as indicated in Table 6.1. It is generally agreed that providing extension agents opportunity to visit and interact or work with product producers serves to cultivate deeper interest and greater confidence.

6.417   Substantial effort has been devoted to analysing the impact of existing R&D extension modes and mechanisms. The conclusion from these studies confirm that similar extension methods are used by different R&D systems. Their effects differ on the basis of factors such as institutional organisation, effectiveness of communication processes and the degree of influence of environmental factors including government policies, social and political atmosphere, readiness to receive the product of target group and level of training and skill of human resource employed in the transfer of R&D products as well as support services. Therefore, no specific model can be recommended as the most satisfactory combination of these sets of components.

Why do they succeed in one situation but fail in another?

6.418   R&D extension modes and mechanisms are effective in R&D systems that have coordinated institutional arrangements; where the research and extension arms of the institute are closely linked and are constantly in effective consultation on user problems, research objectives, efficacy of research findings in user environment, mode of dissemination, and performance of R&D results in user environment. The degree of efficacy of the linkage between information and technology generators and transfer agents (extension systems) determines appropriate mechanisms to be employed in the transfer process and the extent of involvement of transfer agents in advising researchers and technology developers. It is often stressed, that to facilitate closer liaison between research and extension systems, specialists of the extension services be located at R&D institutes if they are not part of them. The advantage of this arrangement is that the extension specialists get to understand R&D programme objectives and participate in their development. They become an integral part of a single system comprising research, development and extension components. Research workers and product developers equally must be exposed to extension environment so that they may develop action-oriented attitudes and understand user circumstances better.

What do we mean by "coordinated institutional arrangements"?

Do you agree with this? What else can facilitate closer liaison?

6.419   **Verification and adaptability trials are other forms of extension mechanisms.** They make the public aware of what exists and whether or not what is available is the appropriate R&D product which the society can make good use of.

6.420   The **principal action agents** which are also the basic components of an effective R&D extension service comprise: (a) the research sector — (generators and developers) (b) extension service — (bona-fide transfer agents) and (c) product users including institutions of higher learning as well as teaching and training institutions; (d) service institutions — (product distributors, technical service agencies, credit agencies and, in case of industry and commerce, traders); and (e) government plans and operational policies and funds.

6.421   These action agent components represent the potential product resource base; knowledge transfer and functional support organisations for policy, funds and mandates; and user groups. These components at some stage act as transfer agents of R&D products, using one or a combination of the modes and mechanisms employed in the information and technology transfer process.

6.422   Exercise 6.1 below deals with **R&D product flow system.** It indicates expected mode of information flow linkages in an effective R&D extension service. Careful analysis of the system demonstrates, (a) that for R&D information generating organs to operate effectively they need support from enabling organisations such as government ministries and private funding institutions. In order to obtain the support, they must supply appropriate information to this and other user groups and demonstrate their products. Some information and technology from R&D institutes will flow directly to users but most of it must be passed on to the extension service which is the principal transfer mechanism of R&D products to consumer and user communities, (b) that functional support organisations such as commercial enterprises, parastatal institutions and the private industrial sector, are constantly in need of information to facilitate development of their sectors and for educating their clients. But these organisations apart from supplying information to consumers, also communicate information to enabling organisations which facilitate flow of resources, design of policies and incentives. Each component must have reciprocal feedback.

How else do they serve as extension elements?

In what way do these components serve as extension agents?

Table 6.1: Extension system function matrices

Actors	R&D extension policy	Organisation Demonstration	Communication	Diffusion
R&D institute management	– develop policy framework – recognise need for product extension – provide policy	– provide direction of effort – budget & allocate resources – design & evaluate	– popularise expectation – provide policy support – monitor and direction	– ensure promotory function – provide resource – reward success
R&D institute product producers (Scientists)		– test and verify findings – interact with extension agents in institute to design transfer techniques – evaluate efficacy and feasibility	– participate in verification training and demonstration – monitor and evaluate performance – monitor feedback	– provide support and backstopping services – monitor progress – improve product
R&D institute extension agents		– identify extendable products – interprete information and pack knowledge – design and test mechanisms of product transfer – identify other transfer agents	– communicate to target groups – demonstrate product includ-ing use – monitor impact and feedback to product producers – provide solu-tion to resolution conflict	– supply product – supply expertise – facilitate provision of inputs – monitor progress – inject modifications and improvements – feedback
		– make trial runs of product transfer – develop links	– monitor impact and feedback – feedback to product producers – provide solution to resolution conflict	– monitor progress – inject modifications and improvements – feedback
Other transfer agents		– monitor available R&D product – develop links	– communicate to target groups – demonstrate product – collaborate with institute extension service – attend to resolution conflict	– supply product – supply expertise – provide resources – monitor progress – feedback inject modifications and improvements
Product users			– try product – evaluate product – provide feedback to to extension agents and product producers – build links with other users	– develop – confidence and expand use feedback adopt improvements and modifications

Exercise 6.1 Basic components or action agents of the R&D Institute Extension System

For each of the issues raised in the exercise as many answers from discussants as are given should be listed on the blackboard and their relevance as well as their implications analysed.

The group(s) will compare experience and the advantages as well as disadvantages of their systems.

In the discussions, effort must concentrate on categorising the following:

*   enabling organisation responsible for providing direction, rewards and resources.
*   functional support organisations responsible for the promotion of interests of defined extension services and transfer mechanisms.
*   information generating institutions and the type as well as role of information.
*   knowledge transfer agents and the role and impact of the transfer agents.

Instructor(s): You may introduce the exercise to give some direction for discussions. Listen for discussions going astray and participate when and where necessary. You may ask particular individuals to present ideas and lead areas of discussions. Assist in the analysis of information and answers listed on the blackboard.

The discussion is on the basic components or action agents of the R&D Institute Extension Systems. Each person should be asked to focus on his or her institution and their extension systems. They should provide as many answers and statements on the following questions:

1.   How many institutions in your system are responsible for extension policy, supporting funds and resources and provision of incentives? What role do they play? Are they effective or ineffective? If ineffective what suggestions can you put forward to improve their contributions?
2.   What role in the extension system to public and private organisations play?
3.   Who are the intermediate clients of RDIs?
4.   Draw a functional information flow chart showing relationships between RDIs, their intermediate clients, enabling and support organisations indicating feedback scenarios.

6.423   Dissemination Techniques and Methods:
There are a variety of extenstion approaches used to
achieve different objectives. For example, in
agriculture, single commodity **approach** may be used
to meet extension needs of a technology package of
single crops. This approach is widely used by
industrial and commercial research organisations in
the introduction of new products. Multi-subject matter
and community development approaches focus on
farming systems and rural development projects.
**Comprehensive regional development or society
thrust approach** using education, investment,
provision of facilities and incentives, taxation, price
controls, local organisations and compulsion is
effective in the introduction of new technology to the
public but it involves, in a complex manner, many
components of the extension systems and demands
deeper public involvement.

6.424   The first extension approach utilises
government policy organs to institute by-laws and
decrees which dictate transfer from R&D institutes of
information or technology and its application by
users. This approach is usually effective in extending
to potential users who may not immediately perceive
the benefits of the new information or introduced
technology and are not yet ready for change but are
prepared to apply it. This approach is particularly
useful in the extension of medical and agricultural
research information and technology such as the
enforcement of vaccinations in public health, and
uniform time of planting and forced control of
dangerous pests in agriculture and public health.

*Under what conditions can
this method of extension be
appropriately applied in your
own system?*

When the benefits of the new R&D institute products
are fully understood and the skills of their utilisation
acquired, users continue applying them voluntarily.
Further diffusion of the information/products takes
place without much effort among real and potential
users.

6.425   Whatever is the approach, all of them use
similar techniques and methods which comprise the
following:

6.425a   Training and visiting (T and V) Method: In
this system the institutional organisation must include
staff of specific training in communication skills in
addition to their special subject matter; and it must be
highly coordinated for different subject specialist to
prepare and provide complete information/

technology packages in a term simple and easy to understand. The functions of subject matter specialists, supervisors and policy coordinators should be clear with clear lines of authority. Both research and extension agents should be jointly involved at least in determining the suitability of the product, the initial exercise of training the trainers, monitoring and evaluating the extension process and deciding on suitable improvements on the product being extended and on the approach as well as techniques of extension. The T&V extension method has several unique advantages (i) it allows heavy people involvement and thus for higher multiplying effect that results from secondary dissemination of information, (ii) it permits face to face contact between product extension agents and product users thus allowing for questions and answers from both sides; (iii) it permits judicious timing with regard to product introduction and step by step education and training; (iv) it provides for joint effective participation of clients, transfer agents and product generators; (v) it forces closer working relationship between extension and research; (vi) it reduces the negative effect of illeteracy on diffusion of innovation.

6.425b Mass Media Technique: Proponents of this method argue that the use of mass media guarantees extensive dissemination of information to different user levels. They further argue that the method encompasses a very wide spectrum of communication techniques including audio-visual aids such as radio and television media, printed information and open community forums. The mass media, by and large is criticised as being an important function only in the industrial and commercial R&D extension services and for selected user communities but of low effectiveness to rural R&D extension services and to rural R&D product consumers. It is argued that in the developing countries rural communities do not have adequate access to radio and television facilities and their literacy levels do not permit them to comprehend printed material. However, reports, journals, reviews, information brochures are useful media for extending information to planners, policy makers, other R&D institution workers, extension and information transfer agents, industrial and commercial institutions and support institutions. The common complaint particularly, concerning publications is that they tend to be much more oriented toward the significance of information or technology than toward how to apply the elements. One of the major drawbacks of this

How effective is this method in a rural situation?

method is that there are few effective specialists who are capable of developing appropriate publications and information materials. When produced, it is done with shallow knowledge of user environment.

What can be the remedy?

6.425c   Education and Training Institutions: Universities, colleges and other training institutions are among the principal and effective means of extending information and technology to different user clients. Most, if not all, of the graduates from education and training institutions are employed in situations where they are required, in one way or another, to apply what they learn. The information and technology they pick up is not only an asset to them but is passed on to the communities they serve and thus act as extension and information transfer agents.

How much do institutions of higher learning participate in generation and dissemination of research information in your system?

6.425d   Demonstrations: This is a method of extension employing visual and perspective cues. It is useful and quite effective if it is organised to comprise occasional open days at the information generation centre, trade fairs and user site demonstrations.

6.511   Relation of RDIs with Extension Service as Intermediate Clients: There are several major factors responsible for gaps existing between the generation of information and its utilisation; and between acquisition of research results and their application.

Why do R&D extension efforts sometimes fail?

6.512   Firstly, it is argued that research objectives are developed by research scientists without evaluation of or regard to the eventual application of the results and the anticipated form in which results could be communicated as well as the appropriate mechanisms for their delivery to real and potential users. Some sorghum cultivars recommended on the basis of high yields to farmers were not adopted by them because they were prone to bird damage or could not provide the taste and fillability desired. Likewise, high yielding dented maize with soft kernel could not be successfully extended to farmers because they did not meet the desired quality of the anticipated consumers. Whereas, therefore, the research objectives of developing high yields, high protein content material were met eventual acceptability was not attained.

Do we know real situation of the prospective users?

6.513   Secondly, in ineffective R&D extension systems coordination of working relationships and of objectives of purpose usually lacks between the research and extension components of R&D

institutions or between R&D institutes and extension agents. The two institutions are often viewed as separate with different objectives and unrelated mandates. For example, the research mandate may be to improve the quality of food crops while the extension service objective is to double the production of industrial cash crops and crops for export. Sometimes, even education and training institutions are not regarded as part of the extension system.

Does constant consultation between research and extension organs take place in your RDI?

6.514   Thirdly, sometimes both the information generating and information transfer institutions see themselves with clear cut mandates. The conveyance and delivery linkages, which should be an overlapping and joint responsibility, is usually ignored as an area of contention. Questions arise such as "How can users get access to research results? Who is responsible for the interpretation of research results and who should communicate them to disseminators and users?" More than often, this situation arises because of lack of clear definition of responsibilities and ineffective interpretation of institutional mandates.

How can they be smoothly linked?

6.515   Technology transfer may fail simply because the pressure for new information technology may not yet be felt by user community. **Timeliness of extension** of an R&D product is, therefore, equally important.

Is your society ready for technological change? Have you examples of this problem in your system?

Case 6.1: The introduction of recommendations for herbicide use at a time when labour was cheap had no impact on small farms in Uganda. It was not until the cost of labour became prohibitive during the late 1970s that the herbicide technology was adopted. Automatically, the demand for herbicides increased several fold.

Does your RDI have have this problem?

6.516   The relationship between research and extension groups in an institution is sometimes strained and competitive. This makes a cooperative flow of information to the user community limited and more difficult.

6.517   Arm chair decisions and bureaucratic problems impair the effectiveness of R&D extension service. For example, management decision may not be taken on time; logistical support services, due to policy hindrances, may be unavailable when they are badly needed; clearances and endorsements may be essential from as many as 5 to 10 officials before users obtain permission to acquire inputs; and in some cases extension specialists are deployed to non-extension services due to lack of qualified personnel in other sectors of national systems. It is clear, government policy in certain developing countries to absorb every graduate resulted in excess manpower and personnel redundancy. In order to create jobs for extra staff more offices are created to handle detailed and sometimes trivial aspects of decision making which would otherwise be handled with speed by one person. An issue is made to be reviewed through several offices. On the other extreme, because of lack of supporting manpower; specialised extension officers are deployed to administrative duties including public relations, thus removing them from their areas of specialised training.

Does this situation exist in your system?

6.518   Poor management of available resources often leads to failure of R&D extension efforts. In civil service and non-commercial oriented institutions, management positions are filled on the basis of seniority rather than qualification. Thus, some persons with poor management qualities of senior standing are given responsibilities of managing resources without the ability to do so resulting in poor resources productivity. It is not enough to make available the needed resources unless effective management goes with it. This is perhaps one of the major constaints on the productive output of the R&D delivery system.

Why is this? How can it be overcome?

6.519   Related to the management constraint is **quality of leadership.** Even when finance, equipment and physical support for extension service are adequately provided, sometimes little change is noticed in the flow of information from research to extension and from extension to R&D product users. Yet, a change just in the leadership can make demonstrable difference.

What are the qualities of good leadership?

6.520   It is often argued that to overcome these constraints research and extension components of a research system should be considered simultaneously for problem identification as well as for problem solving processes that is: knowledge generation, information transfer and information application. It is

How can this be accomplished in practice?

also essential to understand the needs of product users and disseminators right from the research design stage and involve them at each evaluation stage of the R&D product development to ensure the right product is generated and that it is feasible.

6.521   More important, a systems concept must be inculcated in all sectors of the R&D systems. The management and administration sector responsible for policy formulation and custody and for allocation of resources, the R&D product producers responsible for generating information and technology, the transfer agents (extension specialists) and product consumers must be seen as one and same but continuous element. Each sector of this continuum should be conscious of the effect of its action on the other sector and on the whole system. At the same time, each sector should appreciate the effect of its contribution on the overall objective of the system.

How can this be achieved?

6.522   Extension specialists sometimes encounter problems in communicating with potential users of R&D products. Whereas extension specialists see their role as one of training potential users in the application of knowledge and technology, some potential users do not like to be considered as trainees. They feel they are adequately knowledgeable to only seek the information they need. Extension specialists are perceived by them as "middle men" responsible for transfer from research of R&D products. Thus, it is important for the extension specialists to adopt extension approaches and dissemination techniques carefully designed to have the desired effect on their audiences.

What are some practical problems encountered in R&D extension services?

6.523   Sometimes researchers and extension agents who are academically well trained have grown up in urban environments and come from families with financial means. They have difficulties relating to rural socio-economic situations even though they may do well in extending R&D products of a commercial and industrial nature. They may be well trained in technical communication methods but have little experience in communication with non-literate communities and, therefore, lack confidence and knowledge of small scale consumer of R&D products. This situation is common in the agricultural R&D institutes. Researchers and extension agents trained to communicate research information sometimes have little experience on small scale farms or knowledge of farm activities. The small scale farmer senses this quickly and loses confidence in the researcher or

What must be done to overcome these problems?

extension agent. The situation is aggreviated when the research technology which has not been tested under user conditions fails to perform to expectation at the user level. It leaves the user community sceptical of research advances.

6.524   Ideally, the information generating organ of an RDI must have a research arm which has in addition to management an effective administrative support unit to handle personnel matters and take custody of institutional policies. It should also have provision for training and communication activities for in-house requirements and for providing its clients services in these areas. The scientific programmes and research trial sites are obviously necessary components of a research set up. The extension arm of the RDI must have reciprocating arrangement but communication must be highly coordinated in such a complex organisation.

6.525   Externally, free communication should exist between the two arms of the RDI and institutions of higher learning, the private sector and the consumer community. In each case feedback need not be restricted between communicants.

Fig 6.2: Communication flow among RDI beneficiaries
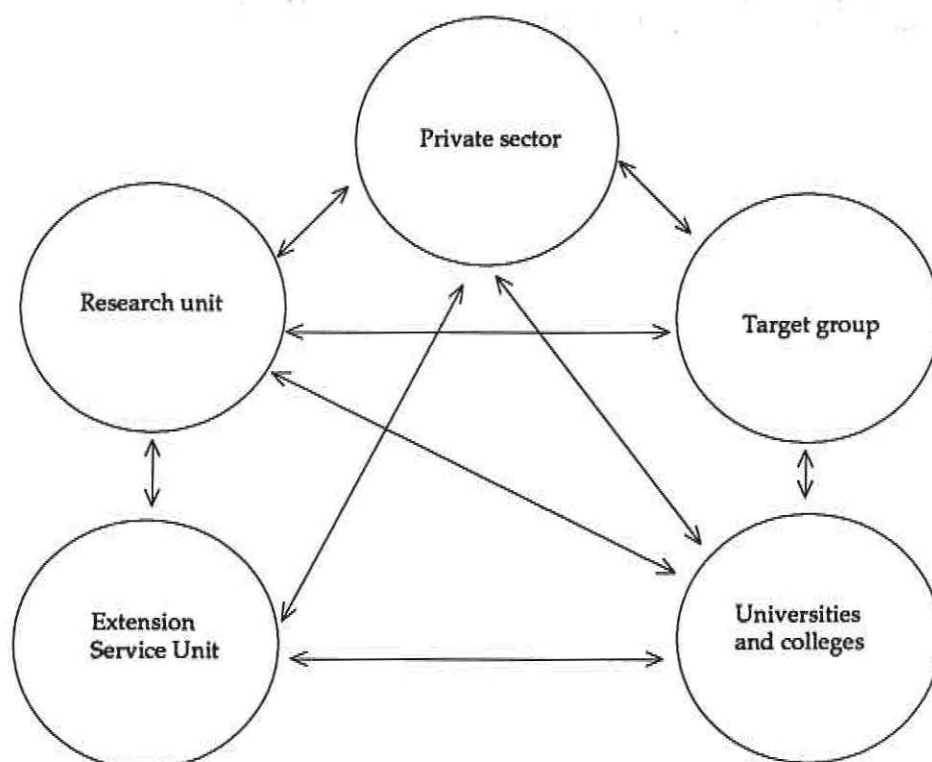
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CHAPTER VII
WHY AN INFORMATION SERVICE?

WHY AN INFORMATION SERVICE?

Training Objectives

By the end of this Chapter, the participants will be able to:

1. Appreciate the importance of information dissemination in the research and development process.

2. Be able to identify the information needs of various RDI client groups.

3. Know the different information channels available to RDIs and how to make effective use of them.

4. Know how to package R&D information for delivery to different target audiences.

5. Be able to identify weaknesses in the information services of their own RDIs and to take steps to rectify them.

6. Be able to design and implement an effective information service for their own RDIs.

7. Appreciate the importance of information networks among RDIs.

WHY AN INFORMATION SERVICE?

Contents

All this material can be covered in one session provided it has been covered on an individual basis prior to the session.

CHAPTER VII

WHY AN INFORMATION SERVICE?

7.111   **Introduction**: At a conference organised by
the African Academy of Sciences, AAS and held at the
ICIPE, Nairobi, a participant referred to the problem
of "results in shelves". These results may be hidden in
learned journals which are read by only a few
scientists in a particular discipline, or in Annual
Reports which are read by even fewer people, if at all.
Can "results in shelves" lead to appreciable
development, and can they create the necessary public
awareness without which research tends to be
dismissed as irrelevant and a waste of resources? The
answer depends on how many people have access to
those shelves. Yet for the information or
communication specialist in an RDI the challenge
begins much earlier. Even getting the results to the
shelves needs his input. How do we turn raw results
into publishable, useable, information and how do we
use this information not only to create public
awareness but also to feed research itself, and to
motivate and inspire the scientists to aim at higher
levels of performance? What are the existing channels
of communication? Are they adequate and effective or
do we need to create new ones? How do we determine
the correct balance between scientist-to-scienstist,
researcher-to-researcher dissemination and
dissemination targeted at the wider public, including
specific client groups such as farmers? These and
many other questions need to be considered when
developing a dissemination programme for an R&D
institute, especially in Africa where the information
between the researchers and the ultimate beneficiaries
of their work is enormous.

7.112   Every RDI needs a well planned and
coordinated information management system that is
able to deliver its most important product —
information — to the right audience at the right time

and in the right form. The information needs by RDI
clients are not static, and a good information system is
one that is sufficiently flexible and responsive to
accommodate the changing demands of the
constituency. This calls for constant innovation on the
part of information specialist so as to engage and
sustain the interest of their audiences. There must also
be a follow-up mechanism so that some feed-back is
elicited from the target audience. Otherwise, there is a
very real danger of bombarding the people we seek to
reach with annual reports, newsletters and other
publications which are never read in any meaningful
way, and therefore do not serve any useful purpose.
This applies not only to publications, but to other
channels of communications as well. For instance, if an
RDI organises an open day or field day there should
be an immediate follow–up to determine areas of
relative weakness and strength which can be taken
into account when organising another similar event.

*What are the key factors
which must be considered
when planning an RDI
information management
system?*

*If you are asked to organise
an open day for your
institute, what would be your
main objectives, and how
would you monitor the cost
effectiveness of the event?*

7.113   The long–term objective of dissemination is to
increase both **awareness and productivity**. It should
aim at motivating and informing all those involved in
R&D decisions, stimulating their interest, increasing
their knowledge base and promoting the necessary
skills. R&D production involves a wide range of
activities by several groups of people — policy
makers, who may also be the allocators of resources ,
researchers, educational practitioners, extension
workers and, ultimately, in the case of agricultural
research, the farmers' themselves, the producers of
food. These groups have different information needs
which must be satisfied, but there is one basic need
they share: the need for relevant and timely
information that can be used in problem-solving or
decision-making situations. This very wide range of
client groups calls for an equally wide range of
dissemination strategies, some of which we are going
to discuss in this Chapter.

Exercise 7.1 List some of the dissemination strategies used by your own RDI and which
in your opinion is the most effective for which client?

7.211   **Profile of the Institute:** The basic raw
material for the communication specialist in an R&D
institute is the information generated by the
researchers. Indeed, it can be said that the first
product of research is information. The researchers
seek to shed more light on what is already known, or
to create new knowledge and occasionally make
discoveries. In the case of R&D institutes, as opposed
to institutes of higher learning, where research can
sometimes be done for its own sake, these efforts are
aimed at specific objectives. There is a mandate to be
fulfilled and programme goals to be met so that the
clients as well as the constituency in general can
benefit. In this process information plays a vital role.
The vital information include the following elements:

*   information about mandate and objectives of the
        RDI;
*   information about the research programmes and
        other activities;
*   information about progress made to date;
*   information about achievements i.e. research
        results;
*   information about future plans;
*   general information about the institute,
        including its resource base;
*   information about collaboration with other
        institutes.

7.212   The question of mandates has been covered in
other Chapters, especially how they are derived and
how they are interpreted. Here we will confine
ourselves to how the information specialist can help in
making an RDI's mandate understood by the various
client groups within the constituency and by the staff
of the institute. Sometimes even the scientists do not
fully understand the mandate of their institute and a
deliberate effort should be made by the
communication people to educate them. If staff are
properly informed about the institute's mandate and
objectives, they will assist in selling the institute to the
public and to potential donors. On the other hand,
uninformed staff can do a great deal of harm to the
institute by giving wrong information, or by not being
able to give any information at all. Obviously, the
communication staff themselves should not have the
slightest doubt about their institute's mandate and
objectives.

7.213   The mandate is usually interpreted in terms of
specific programmes, each with clearly defined goals.

What do we disseminate?

The question of mandates is discussed at length in Chapter II of this **Manual** The information about programmes should be comprehensive and if it is meant for the general public it should be simple and as far as possible it should be in the language of the layman. While 'selling' the institute as a whole, with its total package of programme activities, each programme should also be able to stand on its own in terms of dissemination. A client group or a donor may be interested in just one programme, and there should be an information package readily available for him. He should not be made to sift through a mass of irrelevant information looking for what really interests him.

7.214   There are times when RDIs feel that they have nothing to report, simply because there have been no significant breakthroughs. This, is very wrong because it implies that no progress is being made. The various audience groups we have referred to, such as policy makers, donors, the scientific community, extension workers, etc., all need regular information about the researches being undertaken, even when no real achievement has been made. This information can help in generating goodwill for the RDI, and the goodwill can be converted into support of one kind or another.

7.215   When breakthroughs do occur, RDIs have an excellent opportunity to capture public attention, and the information specialists should take full advantage of these rare occasions. The whole institute becomes alive, with newspapermen chasing scientists for interviews. Apart from publications in learned journals the results must be disseminated more widely, especially when new advances have been made.

Cite an example of such a breakthrough in your RDI

7.216   Most RDIs prepare their strategic plans covering periods varying from 3 to 5 years. These are very important as they give an institute a sense of direction and enables it to make the best use of its resources within a given period. Detailed information about such plans are usually not for public consumption, but selected groups of people need to know about them, especially the donors and enabling bodies. In any case some general information can always be extracted from the Plans for wider use.

7.217   For most people, a general overview about an institute is quite adequate, and this can be in the form of a summary of the institute's objectives and highlights of what has been accomplished. This

overview is very important and should be part of any information package given to visitors and other interested parties.

Exercise 7.2 A newspaper editor comes to interview one of your scientists. The following day a story appears which contradicts the institute's policy. How do you handle such a situation? Discuss.

7.311   Research Collaboration: Collaboration is a key factor in R&D work. If sufficient information is not given about collaboration the institute could be accused of duplicating what other people are doing, whereas in fact they may be working on different aspects of the same problem and contributing different inputs towards a solution. An insect pest research institute may be working on particular crop pests and at the same time collaborating with another research institute working on improved varieties of the same target crops. If such collaboration is not explained fully it might appear to outsiders that there is conflict of interests. Donors are particularly wary of such conflicts because usually it is the same donors funding a group of RDIs and they do not want unnecessary publication.

7.411   Beneficiaries of R&D Results: We have referred to the very varied nature of target audiences for R&D information, and the need to vary our dissemination strategies accordingly. The following are some of the main groups which can be identified.

To whom do the RDI's disseminate?

7.411a   Scientific community: Scientist-to-scientist communication is crucial in research and development work, especially in scientific research where one must keep in touch with the latest developments in one's

field of specialisation while at the same time keeping peers informed about one 's research progress. Researchers usually form an informal network of their own and much information is exchanged between them without the intervention of the communication specialists. Scientist-to-scientist communication should be multidirectional, so as to minimize duplication of effort and facilitate recovery. The dissemination specialists have an important role to play in promoting the creation of information networks and making sure that they work smoothly and effectively. A conference on the **Communications Responsibilities of the International Agricultural Research Centres**, held at IRRI, Philippines, in 1980 summed up the importance of scientist-to-scientist communication as follows:

> "....... scientific communication serves important purposes beyond conveying information. Publication in a prestigious journal provides a scientific reward and recognition mechanism. It is also the accepted method of academic claimstaking of establishing intellectual property. The need and desire for scientists to publish is strong, valuable, and cannot be ignored. In fact, it should perhaps be exploited."

7.411b **Policy Makers**: Research is often given low priority by policy-makers, especially in the developing countries and R&D institutes can only correct this situation by keeping this important client group constantly briefed about what they are doing. One method is by having unofficial "spokesmen" in key policy-making institutions such as parliament or ruling party. Members of parliament are usually people with different backgrounds and interests, and it should be possible for RDIs to target their information on particular MPs who can help in lobbying for support and goodwill, and who can make intelligent contributions during R&D related debates.

What are some of the disadvantages of having a network of informal spokesmen key policy-making institutions?

7.411c **Donors**: The donor community is very demanding in its information needs. Donors want to be sure that their money is being put to good use by the RDIs and that they are supporting a worthwhile cause. As there is stiff competition for limited donor funds it is in the best interest of an institute to give its donor accurate and timely information in a form that can be digested easily. This is true not only of those RDIs which rely on international funding, but also of the national RDI's funded by Governments through

tax–payers money. Any RDI that ignores this group of information users run the risk of being left behind when research funds are being allocated.

7.411d **The Public:** Increasing public awareness of R&D activities should be given priority, but publicity for its own sake should be avoided as it could have negative effects. The international RDIs sometimes find themselves in a difficult position within their host countries and most of them prefer to keep a low profile. Yet if they do not give the public some information about their activities they are open to suspicion. There must be careful balance between the need to create public awareness and the need for an unobtrusive stable environment that is conducive to research work. The public, of course, includes the end users of R&D products. In the case of agricultural research, the farmers have a special interest in the information coming from the research. The international R&D institutes usually have mandates which do not allow them to deal directly with farmers in a given country and they have to channel their information through the national programmes. This division of labour is very important because in most countries extension services are well established and there would be no point in duplicating them. There are many other reasons why international RDI's, some of which are controlled from outside Africa, should not be allowed to do extension work. The best solution is for them to collaborate closely with the national programmes, and in such collaboration a free two–way information flow is essential.

Can you think of dangers of over-exposure in the news media?

7.411e Another important audience, and one that is often ignored, is the **internal audience**; the staff and the other people directly connected with the institute such as Board members. These act as "ambassadors" of the institute and they must be provided with accurate up-to-date information which they can use in their contacts with the outside world. It gives a very bad impression if staff are ignorant or indifferent about their institute e.g. SACCAR.

7.511 **Packaging of Information:** For effective delivery, information must be packaged in an appropriate manner that takes into account the needs of each particular audience. Donors and policy-makers require a different kind of information packaging from scientist and extension-workers. Before any decision is

taken the information specialist must ask himself a number of questions; What audience are we aiming at? What would be the most effective channel of communication? Once the channel is selected, how do we package the information? If, for instance, publications is chosen as the most appropriate channel we then have to narrow it down to one type of publication, and there is quite a wide range to choose from: scientific journals, newsletters, technical reports, brochures and leaflets, annual reports, research highlights occasional papers etc. The final product, say a glossy annual report, will be the combined effort of information specialists, editors, graphic artists and designers, promoters and others involved in the various stages of publication production. In marketing, product packaging is a key factor on which success or failure can depend, and advertising agencies make a fortune manipulating consumer tastes. RDIs need to take a critical look at the way they package their information, and do some of market or audience research to find out what appeals and what does not. This would help to minimise wastage of resources in information dissemination.

What do you understand by the term 'packaging' in the context of information dissemination?

Exercise 7.3 Possible clients would like to have information of your RDI. List possible packages of information for each client.

7.512   **Channels of Dissemination:** There are
several channels of dissemination available to the
RDIs. Some of these are well-tested traditional ones
such as publications. Others such as the use of radio
and TV call for innovation on the part of information
specialists. For most RDIs the main dissemination
channels are:

* publications
* presentations at conferences and other
  professional meetings
* personal visits
* mass media: newspaper, radio, TV
* open or field days.

7.513   **Publications:** We have already referred to
"results in shelves" in the form of schorlarly and
scientific journals and Annual Reports. There are
different types of publications produced by RDIs
ranging from simple brochures to voluminous Annual
Reports and other book length publications. Each
institute needs to have a carefully planned
publications programme and a small professional
team with the necessary expertise in editing, graphics
and production. Where the output is very small, the
work can be contracted to free—lancers but this
arrangement is always unsatisfactory as freelancers
are answerable only to themselves. Perhaps this is one
area where a number of RDIs in a given region can
collaborate and establish a single publications
production facility complete with a well—equipped
printing press.

7.514   While publications play a key role in scientist-
to-scientist communication the other audiences tend to
be neglected. For instance, very few RDIs have
worked out a regular system of keeping donors and
policy makers informed through publications. Some of
the international agricultural research centres (IARCs),
especially the CG centres such as IRRI, ICRISAT and
IITA know the value of keeping their donors fully
briefed, and have a range of publications aimed
specifically at them. The national RDIs are far behind
in this respect, and some of them do not even produce
their Annual Reports regularly.

7.515   **Presentations at Conferences:** These are a
very popular and very effective dissemination channel
among scientists. The role of the information specialist
here is to assist scientists in preparing their
presentations so that they enhance the reputation of

*Your RDI has a new product.
You know you have potential
clients for this product. How
do you intend to disseminate
information about the
product?*

the institute and the stature of the individual scientist.
Hastily written scientific papers and poor slides do
more harm than good and the presenters should learn
to be their own severest critics. It sometimes happens
that one travels thousands of miles to a conference,
only to end up giving a poor presentation.
Communication specialists play an important role, and
they can only play it well if the scientists appreciate
their contribution and cooperate with them in a
meaningful manner.

7.516   **Visits**: RDIs receive many visitors regularly
and yet very few of them treat visitors as a
communication channel. When a visitor leaves an
institute or a research centre with a good impression
he becomes part of a goodwill network for the
institute, and this has a ripple effect. A mistreated
visitor can only leave hatred in his path.

7.517   **Mass Media**: We have already observed how
effective these can be in creating public awareness, but
we have also noted that they have to be used with
care. RDI information specialists should be on good
terms with the mass media people: newspaper editors,
radio and TV producers etc. Apart from enabling the
institute to get news coverage when necessary, such
contacts also minimize the chances of getting negative
publicity, which can be disastrous.

7.518   **Open Days**: These also enhance public
awareness and enable scientists to interact with the
ultimate users of their research results. They should be
well planned and targeted so that the institute can get
maximum benefit from them. Otherwise they could
also lead to negative publicity.

*Can you think of other
channels of dissemination not
covered here?*

*What are the dangers of an
open–door policy for an R&D
institute?*

7.519   **Conclusion**: RDIs need to disseminate
effectively in order to enhance their image as credible
institutions which deserve public and donor support.
But the role of the information or communication
specialist goes beyond that as should be seen as part of
a dynamic process which complements research in
delivering, utilising and monitoring the data,
information, knowledge and technology that it
generates, and facilitates the transition between
research and application.

CHAPTER VIII

NOTES ON BASICS OF CONTRACTUAL AGREEMENTS AND LEGAL REQUIREMENTS FROM CLIENTS

NOTES ON BASICS OF CONTRACTUAL AGREEMENTS AND LEGAL REQUIREMENTS FROM CLIENTS

8.111 **Introduction**: At the outset national RDIs are established through some legal authority such as Acts of Parliament, decrees or promulgation; and it is through these that the mandates are derived. The different statutes of RDIs are covered in Chapter II of this Manual. It should be stressed that whatever the source of legal authority of the RDI, the RDI managers must ensure they secure good understanding of the legal instruments. This will, in the first instance, ensure that strategic policies and plans of the RDI are clearly focused to solving national development goals.

8.112 At the operational level, RDI managers are faced with considerable legal issues; the very act of formulating 'terms of service' and their offer to staff connotes legal implications. Negotiations for funding with sponsors or donors, building contracts, leasing property, negotiating memoranda for collaboration with peer group of RDIs are further steps in the legal direction.

8.113 Very often an RDI will consult their lawyers, or, even sometimes, a legal officer is attached to one of its departments. However, it behoves the RDI manager to develop some knowledge of certain basic legal instruments which would facilitate his grasp and understanding of such instruments like contracts, memoranda, etc.

8.211 In this Chapter we shall simply point out some of the salient features of agreements RDIs are likely to encounter, and to stimulate discussions on these issues as a means to increase awareness among RDI managers.

8.212a   **General considerations:**

*   The importance of legal consultation in the
    preparation, interpretation and signing of
    contractual agreements by RDI must be stressed.
    Directors be encouraged to consult on legal
    aspects.

*   The terms and conditions and obligations of each
    party to the contract to be stated in non
    ambiguous manner to avoid protracted
    arguments.

*   The duration of the contract should be finite;
    should the issue of sub–contracting arise, how
    should it be handled?

*   Mode of payment and purpose for which funds
    are given.

*   Scrutiny of statements in a contract is
    recommended.

*   A careful study of a contract document should be
    done by RDIs before signing. In cases where a
    government agent has to sign the contract on
    behalf of RDI, the RDI should be fully consulted.

*   The RDI should not hesitate to refuse to sign a
    contract whose terms are not favourable.

Exercise 8.1 Participants should be given a copy of contract for study to identify the
elements in a contract

8.212b The inputs to the contract (formulation):

* What is the overall *purpose* or *objective* which the contract is meant to achieve?

* Who are the *parties* entering to the contract?

* What are the *detailed aspects* of the objectives which are to be covered in the contract?

* What are *conditionalities* attached to each aspect?

* What are the *bindings* on either side of the *parties* to the contract in connection with each of the aspects covered?

* What are the *exceptions* to the binding terms and what are the *reasons* for so making them exceptions?

* What *consequences* will befall the party which does not abide by the terms of the contract?

* What *force majeure* circumstances, if any? Unforeseeable course of events excusing from fulfilment of the contract.

* What is the period of validity of the contract?

* What *administrative arrangement*, if any, are required to implement the contract?

* What is the *escape clause* to allow either party to get out of the contract or to verify the contract?

* What are the means of settling disputes?

8.212c Types of Contracts:

* What kinds of contracts are likely to be negotiated between RDIs and clients?

* What other types of contracts are likely to be negotiated by the RDIs?

* What negotiating machinery is best for RDIs; taking into consideration financial/ administrative resources available; involvement, flexibility, etc?

* What kind of training would be necessary to facilitate contract negotiation with your RDI?

*   What procedures should be adopted by RDIs in
    negotiating contracts; taking into consideration
    the RDIs limitations (financial, legal expertise)
    and relationship with parent ministries, etc?

*   What specific examples of common contracts can
    you cite in your RDI?

To note the following:

*   Type of contract;

*   RDIs *status* conditions attached to contract. e.g.
    sound budget; certified accounts; sound
    administration.

*   Examine RDI contracts involving *donors*/external
    financiers and conditions attached — *special
    discussion*.

*   Donor financial policies attached to grants
    generally.

*   Donor conditions of *disbursements*.

*   Donor conditions attached to the status of the
    recipient RDIs.

    *   Audited accounts
    *   Sound budget
    *   Sound administration of RDI as a whole
    *   Organisation.

*   General conditions of what goes into the contract
    as discussed in the introductory remarks.

8.212d Interpretation of Contractual Agreement (Administrative) within RDI:

*   Identification of Proper Officer within the RDI
    whose function will be to interpret (and
    administer the contract)

*   **Consultation Machinery** within the RDI of legal
    bodies outside RDI.

*   **Financial provision** within the budget to meet
    costs of consultations.

*   Settling of legal disputes e.g. Reference Law and
    others.

8.212e Other Considerations:

*   Careful analysis of the terms/offers.
*   Legal impact during drafting and negotiations
*   Amounts of risk involved, particularly financial.
*   What procedural matters must be considered before a contract is signed (Board; Ministers?)

8.212f Legal Requirements from Clients:

*   **Contracts are legal and binding;** they have the force of law and must be honoured by *clients* — where the contracts involve clients. (What kind of clients may be included?)

*   **Mutual Consent** where provided in the contract as way of settling dispute, must be used by RDI and clients instead of legal action.

MANAGEMENT MANUAL FOR PRODUCTIVE R&D:
R&D INSTITUTE-CONSTITUENCY RELATIONSHIP

CHAPTER IX
PROTECTION OF R&D INNOVATIONS: THE PATENT AND LICENSING SYSTEMS

PROTECTION OF R&D INNOVATIONS: THE PATENT AND LICENSING SYSTEMS

Training Objectives

By the end of this chapter, the participants should:

1. Understand and appreciate the nature of patent as a form of industrial property the criteria of patentability of an invention and the mechanism involved in obtaining patent protection

2. Have some insight into the working of world patent system including the Patent Cooperation Treaty

3. Know about the legal systems involved in the protection of plant varieties

4. Know about the patent legal systems operating in Africa

5. Be aware about the different licensing options that may be negotiated with a potential licensee

6. Note factors that need to be taken into account to decide if an institute should have (a) a patenting policy (b) patent information retrieval policy

7. Know the elements that need to be considered in formulating and implementing a patenting policy

8. Understand the channels that an institute could use to tap patent information

PROTECTION OF R&D INNOVATIONS: THE PATENT AND LICENSING SYSTEMS

Contents

All of this material can be covered in two session provided it has been studied on an individual basis prior to the session.

PROTECTION OF R&D INNOVATIONS: THE PATENT AND LICENSING SYSTEMS

9.111   Introduction: The patent system represents formal bargain between the inventor and the public. Its purpose is to reward the competitive, innovative drive with a temporary limited exclusive right, in return for the cooperation of an inventor in sharing his/her finding with the rest of the society. Like most legal systems it has its safeguards as well as its loopholes. Loss of genuine claims to inventions and erosion of granted patents are not uncommon. It is important, therefore, for potential inventors and RDIs to have some insights into the intricacies of the system. Moreover, patent information has become an extremely important integral part of the scientific and technological information, from which researchers can draw useful ideas and the reference to which can avoid unintentional duplication of research effort.

9.112   Inventions and Patents: An "invention" may be described as a new solution to a technical problem. The problem may be old or new, but the solution, in order to merit the name of invention, must be a new one. New in the sense that it has never been thought of before or at least, if thought of by someone not made known by him so that it became accessible to others.

What is the difference between invention and discovery?

9.113   Inventions are rarely the result of an accidental or an instantaneous stroke or genius. They are usually the result of long and hard thinking and experimentation with the precise aim and hope of arriving at a new solution amounting to an invention. In other words, inventions are usually the result of methodical research.

9.114   Such research requires investment; persons have to be employed to carry out research, and laboratories, frequently with expensive equipment, materials and energy sources must be put at their disposal.

9.115   It is not only just but it is also necessary in order to encourage the making of the investment required in research, that *an invention*, once made, should be allowed to be used, at least for a limited time, only by the person who makes it (the inventor), or by the enterprise for which it was made (the employer of the inventor).

9.116   Such exclusivity of use of the invention for a limited period of time (usually a maximum of 20 years) is assured to the inventor (or to his employer) by law, namely the patent law, but only in the country subject to the law. The right is reflected in a certificate issued by a government authority and usually called a patent. This certificate or patent certifies that a certain invention was made by and that it belongs to a certain person ("the Patentee")

9.211   **Patents and other Forms of Intellectual Property Rights:** Patents are a form of industrial property which also includes designs, trade–marks and trade–secrets. The term intellectual property is sometimes used to cover industrial property and copyright (see Figure 9.1). It embraces all new ideas, designs, techniques, processes, devices, products and equipment in a form in which legal protection against imitation and/or copying can be obtained. Like other forms of property, it can be sold, bought or licenced for use.

Figure 9.1: Forms of intellectual property rights
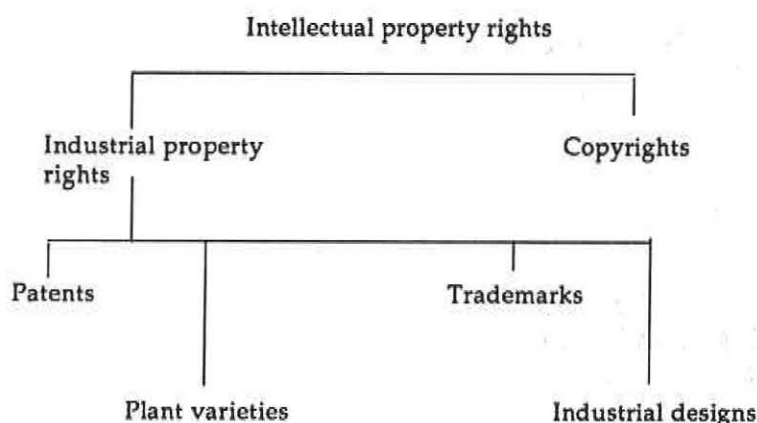
The descriptions given below summarise the main characteristics of the different types of intellectual property rights.

9.212   Patents: These are property rights granted for inventions (new processes, products, devices etc. or any improvements of these) which are capable of industrial applications. In some countries (e.g. USA) patent–type protection is also granted to designs of articles and new plant varieties (so called Design Patents and Plant Patents respectively). Rights conferred by patents (as well as those for other industrial property) do not arise automatically on invention or design, but involve a formal system of application and registration established by statute law.

9.213   Plant Varieties: Microbiological inventions are protectable by patents. For higher forms of plant life, protection in most countries is done by **Plant Variety Rights.** The protection granted is confined to the commercial exploitation of the reproductive material of the plant.

9.214   Trademarks: A trademark may be a word, sign or a symbol used by a manufacturer or a trader to distinguish his or her goods from those of other firms. Trademarks are designed to protect the identity and reputation of commercial products. They do not protect the products themselves or ideas underlying them.

9.215   Designs: These protect the design of articles of manufacture with special emphasis on their ornamental aspects. Articles may include such items as furniture, containers, toys, instruments etc. distinctive designs of which meet special market approval may be a valuable property.

9.216   Copyrights: Copyrights are granted for literary, unusual or artistic works and are awarded for much longer time than for industrial property. A copyright arises spontaneously when the work is created and no registration procedure is necessary. The copyright of a published work is created by appropriate marking on all copies produced. Thus it represents a much simpler system than that of patents. A major difference, however, is that it does not protect the right holder from independent creation by another person of a work of the same or nearly the same content and form. An international convention (Berne

Find out how copyrights are conferred in your home country. List items of works for which copyrights may be conferred and those which may not be protected by copyrights.

Convention on Copyrights) provides reciprocal recognition of copyrights between signatory countries.

9.311   Patentability of an Invention: Not all inventions are patentable. Generally, laws reqiure that in order to be patentable the invention must be universally new, it must involve an inventive step (or it must be non–obvious) and it must be industrially applicable.

These three requirements are sometimes called conditions of patentability. The conditions have been subject to various interpretations in most cases in line with national laws but the following are the most dominant interpretations.

9.311a   Industrial applicability or utility: Although the patent is an intellectual property, it is rooted in the economic rather than the intellectual sphere. This means that an idea, principle, formula or theory, however, ingenious, cannot be patented unless this can be shown to be translatable into a potentially useful product or a tangible process. Likewise, schemes or plans e.g. for running a business, a farm or an industry, are excluded. Article 52 of the **European Patent Convention** also excludes '...... methods for treatment of the human or animal body by surgery or therapy and diagnostic methods practised on human or animal body....', because these are not to be considered as susceptible of industrial application. On the other hand, under US patent law, which puts stress on the general utility of the invention rather than its industrial application, such methods are patentable.

9.311b   Novelty: Novelty is an essential prerequisite to obtaining a patent. It means that the invention must represent something new with respect to "the state of the art" which includes everything in public use or on public record at the time of application for a patent. In many countries novelty may be lost by describing the work that forms part of the invention in a newsletter, journal bulletin, a thesis etc, or by presenting the work orally in a seminar or workshop. Others (e.g. USA) consider a publication or an oral presentation as a bar only if it is 'enabling' i.e. it treats the invention in sufficient detail to enable another expert in the field to put it into use. Grace periods varying between 6–24 months are provided in some countries (e.g. USA, Japan, Canada, Germany and a number of African states) between the time of public disclosure of the subject of the invention and actual filing of a patent

Case 9.1: Recently the International Centre of Insect Physiology and Ecology, ICIPE, filed an application for a patent in the UK patent office for a tick antigen and its use for controlling the brown ear tick. It was hoped that the antigen would form a component of a vaccine which would be used to induce resistance in host animals against the arthropod. The examiner in the patent office accepted the patent claim for the antigen but refused the claim on the use of the antigen for controlling the tick. The latter claim was formulated as follows: "A method of controlling the tick Rhipicephalus appendiculatus, vector of the African cattle disease East Coast Fever, which involves immunising cattle and other

application. In some countries (e.g. Malawi and Zambia), regulations may be issued to protect novelty if disclosure or exploitation arises from agreement between governments for the supply or exchange of information and articles.

9.311c **Inventiveness**: This implies that the inventive step in the invention should not be obvious "to one skilled in the art". To use a simple example, a successful replacement of hexane with say tetrahydrofuran in a vegetable oil solvent extraction process would not be considered to involve an inventive step since it would be obvious to most practitioners in the field that the second solvent would do just as well as the first one. Precise criteria for demonstrating inventiveness or obviousness of an invention have yet to be formulated. Since this has depended largely on judgement, it has been the source of greatest weakness in the patent law and legal wrangles between contending inventors.

9.312 Decisions concerning the inventiveness or obviousness of patent claims have often been based on very subtle criteria. Study the following two examples in the pharmaceutical field from the British case law:–A patent application in 1970 for trifluoroperazine was granted despite objections from rival manufacturers of chloropromazine, a closely related drug. The only difference between the two drugs was that in the new drug the group CF_3 replaced a C1 chlorine of chloropromazine. The patentees for trifluoroperazine were able to argue successfully that no prediction could reasonably be made, on the basis of existing knowledge then, on the effect of substituting C1 with CF_3. If the application had been made in 1986 the chances are that it would not have been sustained since current knowledge allows reasonable prediction to be made about the effect of such substitutions.

9.411 **What may be patented?** The patent law of each state normally specifies what may or may not be patented. There are four broad categories of patent claims. Thus a claim may be based on:

* a new product, device or machine;

* a new composition such as pesticidal or pharmaceutical blend containing an active component not necessarily new;

hosts with a preparation containing the antigen....". The ground for rejection may be summarised as follows: methods of treatment of the animal body by therapy are excluded from patentability under British Patent Law, these not being susceptible of industrial application. Compare this with Article 52 of the European Patent Convention cited in section 10.311

What counter argument could have been formulated against the examiner's objection?

Case 9.2: A patent application in 1927 for a process for the manufacture of a series of antibacterial compounds of the formula,(I) could not be sustained because another company already held a patent for the parent compound (n = 1 in the formula). It was ruled that the demonstration of antibacterial activities for the series of compounds with n 1 by the new applicants, amounted to no more than a simple verification of what could have been reasonably predicted by one skilled in the art.

*   a new process such as one involving chemical or
         microbiological transformation for the
         production of a useful substance; or

*   a new method or a technique which is an
         improvement over existing ones e.g. of filling
         tooth cavity, determining cholesterol in blood,
         diagnostic method, etc.

A patent application may be based on one or more of
the above claim types.

9.412   A number of countries exclude patent claims
based on certain kinds of products e.g. chemical
compounds or pharmaceuticals. Protection for these,
however, may be covered under process patents based
on their methods of preparation. Mention has been
made in section 9.311 of the exclusion by the European
Patent Convention of methods for treatment of human
or animal body. On the other hand new products and
devices involved in the methods can be patented.

9.413   Patent laws are changing, albeit slowly,
generally toward widening the scope of protectable
inventions and discoveries. One area where attitudes,
interpretations and laws are changing rapidly is on the
question of living things and naturally occurring
substances. The idea of patenting 'life–forms' (except
plant varieties) has always been an anathema in the
patenting world, and the position on natural products
has been that if these are not new how can they be
patented? On the other hand, patenting of new cell
lines, virus and strains of microorganisms has been
possible under UK law and the laws of most
Commonwealth countries. Recently, a new bacterium
was allowed for the first time in the USA and
patenting of genetically engineered microbes is now
becoming common the world over. On natural
products, the following quotation taken from a ruling
by Patents Court in the Federal Republic of Germany
on a peptide antibiotic of fungal origin, sums up a
view to which many patent laws are converging: "the
product defined was novel because there had been no
previous awareness of its existence and no one had
been in a position to make use of such a substance ..".
This is particularly welcome for African countries with
their rich resource of bioactive natural products
derived from its indigenous flora.

9.414   Plant varieties may be protected by different
legal mechanisms in different countries. In the USA
(and a small number of other countries) new varieties

of plants arising from classical breeding methods are protectable by the general patent law. However, the patent grant is limited to excluding others from asexually reproducing the plant. Since 1970, sexually reproduced plants may be protected in USA by means of "Certificates of Protection" under **Plant Variety Protection Act**. The European Patent convention excludes plant or animal varieties from protection under patent law. However, in Europe and many other countries, plant varieties may be protected under other legislation viz Plant Variety Rights. The **International Union for the Protection of New Varieties of Plants (UPOV)** comprising about 20 mainly industrialised countries, oversees matters relating to plant varieties and provides a forum for agreements designed to achieve a measure of uniformity in the law pertaining to plant varieties in these countries. The convention provides exclusive rights to the commercial production, sale and marketing of seeds (or vegetative propagating material) of new varieties to the breeder in the member country.

9.415   Of the African countries with indigenous patent systems, at least two countries — Nigeria and Sudan — exclude plant or animal varieties from patent protection. Excluded also are the essentially biological processes used for the production or breeding of new varieties of plants and animals. However, microbiological processess and products may be patented.

9.416   Plant patents and plant breeders' rights have become sources of a major international controversy recently. It has been alleged for example, that these rights have led to (a) the reduction of exchange of germplasm and even jettisoning of germplasm by private seed companies who look upon genetic raw materials in their breeding programmes as their own private property; (b) the narrowing down of the genetic base of breeding programmes because legal protection of new varieties required them to be distinct, uniform and stable, requirements which have encouraged breeders to put undue emphasis on plant morphology to the detriment of others and to work on a narrower genetic base; (c) the erosion of the economic incentive to continued propagation of unpatented traditional varieties and thus discouraging reliance on diversity, and (d) placing the third world farmers increasingly at the mercy of the giant seed multinationals. A major point of contention has been

Think of measures African countries could take to ensure that (a) the genetic diversity of its crop, horticultural and other plants is not eroded by any plant variety protection legal system they may promulgate; (b) the flow of germplasm to industrialised countries does not continue to occur at the economic expense of Africa.

that developing countries have been required to pay royalties for varieties, the germplasm of which originated from their own lands.

9.511   **The Patent Application:** The request by the inventor to the government authority (usually called "the patent office" or "the industrial property office") asking for the grant of a patent is called a patent application. Its contents are prescribed by the patent law of the country in which the application is made. **A patent application is a legal document which requires a lot of experience and expertise to prepare.** Its content and form must be capable of fulfilling the different requirements of countries in which it may be filed. The following elements, including the order in which they are presented, are common to most applications:

(a)   Title and field of invention (i.e. the subject of invention).

(b)   A statement of the utility of the invention.

(c)   A discussion of prior art – i.e. background information and a statement of the *problem* to be solved or the deficiency of prior art.

(d)   A summary of the invention including how it solves the problem or *improves* upon prior art.

(e)   Detailed elaboration on all aspects of the invention.

(f)   Details description of the different facets of utility of the invention.

(g)   Working examples of the invention.

(h)   Claims–itemised legal description of what is being claimed.

The title and field of invention are similar to titles and abstracts used in scientific papers. Elements b. to f. may not normally be divided into sections but each is addressed to some degree in the application after the description of invention. Working examples of the invention need to be provided in sufficient detail to enable a skilled person to carry out the invention. Inadequate information may lead to the invalidation of the patent. As part of the examples there may be need for illustrations (drawings of devices, electronic

circuitry, flow diagrams etc.) or a description of how to use the invention. These should include a description of tests performed to demonstrate utility.

9.512   Elements (a) to (g) collectively constitute what is known as the "specification" of the patent application. This is immediately followed by the patent claims which represent the heart of the patent and the most difficult to formulate. The claims define the metes and bounds of the exclusivity represented by the patent grant. Any facet of the invention which is not specified under 'claims' will not be protected.

Study a copy of the patent disclosure provided (UK 37760/76) and delineate the various elements outlined above.

9.611   **Where to Patent?** As a general rule one patents in a country where one anticipates a specific economic advantage when the invention is eventually commercialised. Patenting is an expensive undertaking and the expense is proportional to the number of countries where one wishes to get patent protection for one's invention. Fees for the basic filing and issuance of patent may run to about US$1500–2000 for each country where the patent is filed. In addition fees charged by a patent attorney may run into several thousands of dollars depending upon the extent of services rendered.

9.612   An invention from an R & D institute in Africa has limitations and properties as follows:

9.612a. Its use is limited to tropical Africa and similar socioeconomic or ecological conditions. The market is likely to be limited to these areas and profitability relatively low; multinational corporations are unlikely to be attracted; commercialisation will most probably be undertaken by local entrepreneurs or parastatal organisations on small–scale basis.

9.612b. If its use is as above, but the invention is rather specialised and involves technique–intensive bridging work before it can be commercialised, then the final product will have limited geographical market but may be sufficiently high–priced to be lucrative to multinational corporations and commercialisation may be undertaken by these corporations alone or in partnership with local organisation (private or public).

9.612c. If use, however, is widespread to include industrialised countries, the large market and the scale of production are likely to attract multinational corporations.

9.613   As a rough guide inventions under category 9.612a need only be patented in those African (and other third world) countries where the product will eventually be manufactured or marketed. Inventions under category (b) and (c) could be patented either in potential user countries or potential manufacturing countries whichever are significantly fewer. Other considerations may need to be taken into account e.g. which would be easier to prevent– infringement by manufacturers in the countries of manufacture or by importers and distributors in the countries of use? Moreover, would it perhaps be easier to negotiate licence agreements with a restricted number of large corporations than with importers and distributors in a large number of countries?

Taking into account the nature of research the institute you represent is involved in, what categories of inventions as defined above do you expect to come out in the near future?

9.711   **Patent Systems in Africa**: The Patent Systems in Africa represent largely the legacies left behind by the former colonial powers. They could generally be put into the following groups:

9.711a   The Francophone countries belong to the organisation Africaine de la Propriete Intellectuelle, (OAPI) which has a fully functioning patent system.

Currently OAPI is the only inter–state organisation in the world with a unified legislation on industrial property rights. This means that grant covers all the OAPI members states. OAPI headquarters is located in Yaounde, Cameroun.

9.711b   **The English Speaking Group**: The anglophone countries have formed a much looser intergovernmental organisation originally known as English Speaking African Regional Industrial Property Organisation (ESARIPO) and now African Regional Industrial Property Organisation (ARIPO). The primary objective is cooperation in matters relating to patenting and creating provision for patent documentation and information.

Currently three main categories of patent systems prevail in the ARIPO group.

* The first category embraces Botswana, Lesotho and Swaziland which confere automatic protection to the registered proprietor of a patent granted in the United Kingdom (UK).

* The second category entails a system for the registration of a patent granted in the UK. States

that continue to adopt this arrangement include Gambia, Ghana, Kenya, Seychelles, Sierra Leone, Tanzania and Uganda. Botswana, Lesotho and Swaziland have a similar arrangement with patents granted in South Africa.

*   The third category represents countries with their own patent legal systems, and which issue their own national patents in accordance with those systems. Countries under this category include Liberia, Malawi, Mauritius, Nigeria, Seychelles, Somalia, Sudan, Zambia and Zimbabwe.

9.711c The Portuguese Speaking Group: The Portuguese speaking countries have no patent legal system of their own and are eventually expected to join one of the other two groups.

9.711d Ethiopia: Ethiopia is a member of ARIPO. It has no specific patent legislation but operates a unique system of public advertisement of patent rights claimed and the issuance of a certificate for such advertisement.

9.711e North Africa Countries and South Africa: The North African countries including Egypt, Tunisia, Morocco; Libya and Algeria as well as South Africa operate their own individual patent systems.

9.712   The patent systems in Africa have been criticised for being too external oriented i.e. facilitating protection, on rather favourable terms to foreigners and multinationals without similarly encouraging local inventors and local exploitation of inventions. Consider, for example, the following facts:

9.713a   In 1976, about 900 applicants for filing or registration of patents were filed in 10 Anglophone African states (Gambia, Ghana, Kenya, Malawi, Mauritius, Nigeria, Somalia, Tanzania, Uganda and Zambia). The foreign applications accounted for about 97% of the total. In 1978 a total of 101 patents were registered in Kenya, all from non–residents..

9.713b Fees charged by African states for processing patent applications and periodic renewal of the patent grants are comparable to those charged in industrialised countries. No distinction is made (except in Liberia) between foreign and local applications.

Suggest some ways by which patent systems in Africa could be reformed to reconcile on the one hand, the need to attract foreign investments and patented technologies and on the other, to encourage local inventors and local exploitation of both local and foreign inventions

9.713c With the exception of Liberia, no African state has any provision for patents granted but are not commercialised within a certain period. Liberia has an article of law which stipulates that an alien who does not work his invention within 3 years from the date of patent grant abandons his rights to the public.

9.714   **World Patent System**: There are a number of aspects relating to World Patent System. The most important one is The International Patent Classification (IPC). The Industrial property offices which handle the very large number of patent documents published each year, are faced with a problem of the maintenance of the search files conttaining the published patent documents. The Industrial property offices therefore developed systems for the classification of patent documents which permit the filing and rapid and reliable retrieval of patent documents for the purpose of search.

9.715   The classification system used by most industrial property ffices for classifying the documents is the "International Patent Classification" which has as its primary purpose the establishment of an effective search tool for the retrieval of patent documents by industrial property offices and other users to establish the novelty and evaluate the inventive step of patent applications.

The IPC, furthermore, has the important purpose of serving as:

*   an instrument for the orderly arrangement of patent document in order to facilitate access to the technological and legal information contained therein;

*   a basis for selective dissemination of information to all users of patent information;

*   a basis for investigating the state of technology.

The IPC attempts to cover all technological fields in which inventions susceptible to patent protection may be made.

9.811   **Routes and Procedures for Obtaining Patent Protection**: One of the first steps one has to take when one has an invention that one considers worth patenting is to seek priority without delay by filing an application normally in one's home territory (UK for

category 9.611a and 9.611b of ARIPO African states). This guarantees one's priority in other states provided one also files corresponding applications in these states within a year of the home application.

9.812   Filing in foreign countries may be done on a country–by–country basis or through international organisations such as the Patent Co–operation Treaty (PCT) and European Patent Convention (EPC). The PCT, which is administered by the World Intellectual Property Organisation (WIPO) based in Geneva, embraces a broad selection of contracting states including USA, USSR, Japan, Scandanavian countries, EPC, OAPI and a number of African and Asian states, and is particularly convenient for Third World countries. A single application with PCT covers all the PCT contracting countries in which the applicant wishes his invention to be protected. The PCT route eventually leads to national patents granted in accordance with the national laws of the states selected for protection.

9.813   A patent application goes through varying degrees of official examination depending upon the legal system of the state concerned. The first stage in most examination processes, including that of PCT, is novelty search. This leads eventually to the search report and the publication of the application 18 months after the claimed priority date. PCT has a provision (Article 15.5) specially created for the developing countries, which allows these countries to submit all their national applications to one of PCT's International Searching Authorities (which include the EPC and the patent offices of Austria, Japan, Sweden, USSR and USA) for international search.

9.814   If the invention is confirmed as novel, then a substantive examination of the specification and claims is carried out on request by the applicant. A PCT application receives only a preliminary examination at the international phase, final examination being carried out at the national levels. A patent may eventually be granted after all questions raised by the examiner are satisfactorily resolved by the applicant. Many states allow a certain period for any challenge to be made by a competitor. If no such challenge appears the patentee is free to licence his patent or to put it to use himself. The term granted for a patent varies around the world.

European countries award 20 years from the
application date. USA and Canada give l7 years from
the date of grant of the patent. In Africa, it varies from
14 years from the date of grant (Mauritius and
Seychelles) to 20 years from the date of application
(Liberia, Nigeria and Sudan).

9.911   **Selling and Licensing**: Licensing is largely a
business transaction between a patentee and a
licensee. The first fact to be clearly established is that a
patent is a piece of property of the patentee. It can be
utilised in various ways; it is like a man who owns a
house. He has a piece of property which he can keep
entirely for his own use; he can sell it outright; he can
permit others to live in it on payment of a rent; or he
may be able to borrow money against the security of
his possession (he can mortgage his house). Similarly,
a patent is a piece of property which the owner can
keep to himself, or sell, or rent out; or even mortgage;
The last possibility is rare.

9.911a **Keeping Possession**: The patentee can retain
possession of his patent for his own enjoyment. It will
ofcourse bring him no financial reward if he simply
puts the patent document in a drawer and only brings
it our for the admiration of his friends.

He may however have a perfectly good reason for
retaining his "property" entirely to himself, if he is
manufacturing and selling his invention. In this
respect the patent will remain in a safe place and there
will be no transactions in connection with it.

9.911b **Outright Sale**: The second possibility is that of
outright sale. The obvious difficulty in outright sale
lies in assessing the value of a patent. It should
therefore be noted that there is a considerable risk in
the outright disposal of a patent. The chief danger
being that the purchaser may pay the patentee but
make nothing our of the deal or that the patentee may
sell his rights and regret it ever after. There is a clear
way of guarding against either of these unfortunate
happenings, and it has the supreme advantage of
being eminently fair to both sides. This is by means of
alicence.

9.911c **Licensing**: As a general principle when a
patentee grants a licence he permits someone (the
licensee) to make a and sell his invention in return for
some kind of payment. Usually the payment is in form
of a royalty. Licences are sometimes called royalty
agreements.

The licensee must ensure that the licensor is indeed entitled to grant a licence and that the patent is of real value. There are three kinds of licences.

9.912 **Non–Exclusive Licence:** A non–exclusive licence simply means that the patentee is allowing the licensee to operate under it himself and he is quite free to grant others non–exclusive licences.

9.913 **Sole Licence:** Sole licences are not very common. In a sole licence patentee grants a licence to one person and binds himself not to grant any other licences under the patentee but the retains the right to operate under this patent himself.

9.914 **Exclusive Licence:** Most patent licences are exclusive because, for all practical purposes, an exlcusive licence puts the licensee in the same position as the patentee. If there is an exclusive licence, no one other than the licensee can operate under the patent – not even the patentee himself. Because of the exclusiveness of such a licence, the patentee cannot grant one if there are previously granted licences.

9.915 The licence agreement embraces the terms settled between the licensor and licensee. It is a legal document which can vary considerably in complexity depending upon the nature of the patent. However, one expects to find the following elements in the agreement:

* Identities of the parties
* Preamble of the agreement
* Definition of key words and the scope of the invention covered by the patent
* Type of licence
* Scope of licence – field of invention
* Initial manufacturing and selling rights including territorial extent.
* Down payments
* Royalty rate and base
* Infringement provisions
* Duration and termination conditions
* Settlement of disputes, etc.

9.916 An R&D institute involved in negotiating terms of licencing will clearly need the service of a licensing executive with experience in evaluating the worth of the technology being licensed, negotiating skill and general legal and patent law knowledge. In addition, it will need a lawyer who would be responsible for drafting the agreement.

9.1011 Patenting and Patent Information Policies:
The question asked in the previous section may now
be formulated in somewhat more specific terms:
bearing in mind the nature of R&D activities of the
institute in question, would a policy on (a) patenting
and (b) patent information, help promote the goals of
the institute? Let us now consider these two aspects in
more detail.

9.1012 Patenting: The first point that must be
considered is whether the institute in question is
engaged in sufficiently basic work which could lead to
new inventions or discoveries. Or, does it largely carry
out work which involves testing the application of
existing knowledge or the adaptation of known
technologies, activities which are less likely to lead to
patentable inventions? If the institute is involved
actively in the business of searching for new
techniques, agents, devices etc., for carrying out
specific tasks or for solving specific problems, then it
probably needs a policy on patenting. However, it may
be pointed out that innovation is not a monopoly of
those engaged in basic work. New ideas leading to
novel modification of existing products, techniques,
devices etc., often arise from certain categories of
applied research.

9.1013 The second point to consider is the institute's
primary motive for adopting a patenting policy. If the
intention is to generate some financial returns in the
form of royalties from licensed patents, then it may be
necessary to assess more adequately the
commercialisation potential of the inventions likely to
arise from the institute as well as the economic value
of the resultant commodities. It may be reiterated that
patenting is a costly undertaking and only a small
proportion of patented inventions is eventually
commercialised, so that even over a period of time,
what an institute may incur from patenting may
outstrip what it may recover from royalties. If the
research activities of an institute are fairly well
defined and non–variable, then it may be possible to
gauge the general economic value of its potential
inventions, and an overall decision may be possible on
whether to adopt a patenting policy or not on the basis
of purely economic considerations.

9.1014 However, there may be another important
motive for adopting a patenting policy, even if this is
unlikely to generate significant funds for the institute.
Licensing of the patents could provide the institute

with a means of controlling the pricing of the products resulting, after all, from its research activities. That may be an important social goal of the institute.

9.1015   If your RDI is directly affiliated to an industrial concern that commercialises or uses your inventions, then you may have a very different option for protecting your innovations i.e. in the form of trade secrets (sometimes referred to as proprietary know–how'). A number of factors may influence the decision to protect an invention as a trade secret including the fear that patenting would reveal to competitors information that might stimulate the search for closely related alternatives. The major disadvantages of trade secrets are difficulty in maintaining a secret and the possibility that a competitor may independently discover and patent the same invention.

9.1016   **On Patent Information:** Patent disclosures have the following special advantages as sources of technical information:

*   A large proportion of technical information is contained *only* in patent documents.

*   Patent documentation embraces all stages of technical development and information can be selected from any technical development level.

*   New inventions often appear in patent publications long before they are published elsewhere.

*   Because of the statutory requirement of the patent grant the information contained in patent specifications is often more exhaustive than that available in monographs, books and technical journals.

*   Expired patents could be used without infringement.

9.1017   According to WIPO statistics there are over 30 million patent documents collected in the patent offices world–wide. About 1 million new patent documents are published every year in about 70 countries. All industrialised countries and a number of developing countries have developed efficient systems to provide easy access to this vast amount of technical information to their industries, R & D institutes, government agencies and others.

9.1018   R&D institutes and industrial research laboratories elsewhere rely heavily on patents for information and new ideas. If an institute in Africa is engaged in an area of research where there is significant patenting activity (e.g. pesticides, pharmaceuticals, solar energy devices, lighting, heating, biotechnologies, etc.), then it could similarly benefit appreciably from patent information. A policy on tapping this information could then be considered vital for the institute.

9.1021   **Elements of a patenting policy:** Assuming that need for a policy on patenting has been established, the next question that may be asked is, 'what factors need to be taken into account in formulating and implementing this policy?' Outlined below are the more important elements that will have to be addressed.

9.1022   **State laws and legal status:** An important consideration is whether national laws on intellectual property impinge on any patent policy that you formulate for your institute. If you are a public institute then, in any case, you need to operate within the State system.

9.1023   **Patent rights and assignments:** If the patent system in your country requires that patents are granted to the individuals who actually have made inventions (or you may want to do this as deliberate policy of recognising innovations by individuals), then your institute needs to sign an agreement with the technical employees that requires them to assign patent rights to any inventions they make during their employment to the institute. The agreement may also include a statement on the obligation of the employee to disclose all inventions to the institute, to maintain adequate records, to safeguard the confidentiality of the invention and to cooperate with the institute in all matters relating to obtaining a patent. A statement on the institute's position on the question of patent rights should also be spelt out in a patent policy document which should be accessible to all staff.

9.1024   **Regulations on confidentiality and records:** In addition to incorporating general clauses in service agreements on confidentiality and records, it may be advisable for the institute to promulgate a set of internal rules and regulations to ascertain that (a) no information concerning patentable inventions leaks out, inadvertently or otherwise; (b) all ideas and

experimental work relating to potential inventions are recorded, duly dated and witnessed . This may help forestall challenge to inventorship relating to potential inventions from within the institute, and to priority from without.

9.1025   Decision by the institute not to patent: If an institute decides not to adopt a patenting policy or concludes that a given invention is not of sufficient interest to justify the cost of filing an application, it has the option of allowing the inventor to exploit the invention personally and at his/her expenses, if he/she so wishes. This provision should preferably be incorporated into the patent policy statement of the institute.

9.1026   Compensation: A clear statement on compensation for patentable inventions acts as a potent incentive to the potential inventors. Methods of compensating the inventor may vary. It may be based on each granted patent application or on the value of the invention. In Japan and many European countries employers are required by law to share with inventors a certain percentage of any profits or royalties that result from patented inventions. You would need to check the legal position on this matter in your country of operation to determine if you have any option on the matter.

9.1027   Inventorship criteria: A statement on who qualifies to be an inventor needs to be given. Conception of the key idea of the invention and the creative translation of that idea into practice are the two important criteria used in identifying the inventors. This means that those who contribute to routine experimental work or play peripheral roles are excluded.

9.1028   Collaborative projects: If you are involved in cooperative research, then you may need a provision in your policy for patent–sharing agreements with the collaborating institutes.

9.1029   Administrative arrangements: An enormous saving in consultancy fees by the institute can be made if it adopts a policy of gradually raising literacy in patent matters among its staff and generating some expertise within a selected group. The latter could constitute a special committee whose tasks could range from evaluating potential inventions, preparing and prosecuting patent applications, to acting generally as a watchdog on patenting affairs.

9.1030 **International connections:** The PCT and a number national patent offices (e.g. Swedish) have provisions for a variety of services to the developing countries. In view of the limited information facility of most R&D institutes in Africa, a time and money saving policy would be to seek the assistance of OAPI, ARIPO or one of the International Searching Authorities of PCT to carry out such tasks as preevaluation of inventions, novelty search etc., prior to preparing and prosecuting patent applications.

9.1041 **Tapping patent information:** How does an R&D institute in Africa gain access to patent literature? There are two aspects to this question: (a) retrospective searching when undertaking a new project and (b) maintaining awareness of what is currently being patented in one's field of activity. There are several channels outlined below that you may wish to explore.

9.1042 **Retrospective search:** This refers to storage and retrieval of information on patents.

9.1042a **The Organisation Africaine de la Propriete Intellectuelle (OAPI)** in Yaounde has an operational patent documentation system designed primarily to serve the African clientele made up of small and medium sized enterprises and research institutes.

9.1042b Members of ARIPO have formed a branch organisation called the Patent Documentation and Information Centre for English Speaking African Countries (ESAPADIC), which has been operational since 1980, with the primary goal of building capabilities for a patent documentation and information system at its headquarters in Harare, Zimbabwe. ESAPADIC operates through the offices of the Registrar General in member states and maintains close collaborative links with the Swedish Patent Office. Plans by the organization to make use of computer links with patent information data banks elsewhere in the world are underway.

9.1042c PCT's International Search Authorities accept search requests from developing countries for state-of-the-art information on specific technical problems. The Swedish Patent Office has been particularly active in this regard.

9.1042d For those in the chemical field, Chemical Abstracts, available in most university libraries is probably the most complete and best indexed of the

generally available sources of information on chemical patent literature.

9.1043 **Current awareness:** For chemical patent literature, Chemical Abstracts is very useful.

Derwent Publications, London, produce a series of **"Alerting Bulletins"**, arranged by subject matter, considered to be the most convenient source for keeping abreast patent literature in different fields.

Exercise 9.1 Bearing in mind the nature of your R&D work, propose now need for (a) a patenting policy, and (b) a patent information retrieval policy, for your institute.

Justify the details of a patent policy of your RDI. Discuss the plan with your colleagues.

RDI Patent Policy: Selected reading for more study

J.T. Maynard. 1978. **Understanding Chemical Patents.** American Chemical Society, Washington, D.C.

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CHAPTER X
EXERCISE ON RDI
SOCIAL ACCOUNTABILITY

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EXERCISE ON RDI SOCIAL ACCOUNTABILITY

10.110   National RDIs have their primary responsibility to the public. Emphasis has already been placed in this **Manual** for R&D efforts to be targeted on national development. Whereas technical accountability is routinely performed by RDI's and researchers, research and development institutes have a social accountability to fullfil. They are expected to produce results that will impact social and economic development.

10.111   As a quick checklist, RDIs can use these as guidelines for ensuring that they are socially accountable for their efforts.

10.111a Justification

*   What is the mandate of your RDI?
*   What specific problems is your RDI tackling?
*   What is your constituency/client?
*   What are the source of funding for your RDI?

10.111b Elements of Social Accountability

*   By what mechanisms does your RDI respond to the needs of constituency?
*   What ways are used to identify needs of constituency?
*   How does the RDI undertake financial accountability?

10.111c Ways of Promoting Social Accountability

*   How does your RDI ensure constituency
    awareness of activities of the RDI?
*   Is there any consultation with clients to ensure
    initiation of relevant research?
*   How does your RDI disseminate information and
    market its output?
*   Does it undertake timely release of useful
    information to meet clientele needs?
*   How does the RDI determine the cost/
    effectiveness of its activities?
*   What categories of staff does your RDI have?
*   Do the staff inspire and promote confidence of
    the RDI? If not why? If yes, how?

10.111d Limitations to Social Accountability

*   What are the limiting factors and how do you
    attempt to overcome them?
*   What is the RDI management policy — is it
    overbearing thus limiting institutional flexibility?
*   What is the institutional environment e.g. how
    well motivated are the staff?
*   Is there adequate communication on the part of
    scientists within the RDIs?

10.111e Consequences of Neglecting Social Accountability

How does your RDI avoid the following?

*   loss of financial, material, moral support from
    clientele and policy makers;
*   loss of credibility;
*   demoralisaton of RDI staff; and
*   possible closure of RDI because of poor output?

GLOSSARY

Science — the study by man of nature and his environment in order to gain a better understanding of the same.

Technology — the body of knowledge that relates to improved production and provision of goods and services to man.

Development — the process of positive change that helps to enhance the well being of a given people.

Determining — the collection of individuals, institutions pressure groups that have to be satisfied with the outputs of research.

Client — the individual, individuals, or institutions that stand to benefit directly from the outputs of research.

Mandate — an authoritative command, instruction, or direction given to an RDI to perform certain tasks.

Mission–Oriented — fulfilling a task by providing solution to a specific problem.

Client–Oriented — performing a definitive task to provide an answer to a request from the client.