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# REPORTS

**INDONESIAN INSTITUTE OF SCIENCES - DENVER RESEARCH INSTITUTE**

**R & D MANAGEMENT WORKSHOP**

Lembang, Bandung, 22 November - 1 December 1976

Tugu, Bogor, 6 December - 18 December 1976

**J A K A R T A**  
**J A N U A R I, 1977**

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REPORT  
ON  
INDONESIAN INSTITUTE OF SCIENCES - DENVER RESEARCH INSTITUTE  
R & D MANAGEMENT WORKSHOP

Lembang, Bandung, 22 November - 1 December 1976

**I. INTRODUCTION**

This is a report on the Indonesian Institute of Sciences (LIPI) and Denver Research Institute (DRI) "R & D Management Workshop" held in Lembang between 22 November and 1 December 1976. The objective of this cooperative project was to increase the effectiveness of Indonesia management of R & D activities through a management training workshop for the senior management of Indonesian R & D agencies, centres and institutions.

The workshop was organized and conducted by LIPI and DRI, with assistance from several ministries and non-ministerial agencies. Thirty participants comprised of division heads of Research Agencies and Research Centres, and institute directors from LIPI, BATAN (National Atomic Energy Agency), LAPAN (National Aeronautics and Space Agency), the Ministry of Industry (MOI), the Ministry of Public Works and Electric Power (MOPW + EP), the Ministry of Agriculture (MOA), the Ministry of Defence and Security, the Ministry of Mines, the Ministry of Communications, the University of North Sumatera and the Hasanuddin University took part in the Workshop. (Attachment I is a list of participants). The participants were selected from each participating institute by the director of the agency or centre to which the institutes belong.

The DRI team was led by Dr. Ronald P. Black and consisted of himself, Mr. Donald D. Evans, Dr. Clinton A. Stone, Mr. Joseph C. Profita, and Dr. Theodore W. Schlie. In preparing and conducting the Workshop they worked with a "Steering Committee" comprised of members from LIPI, MOI, and MOPW + EP, and MOA and an "Organizing Committee" composed of LIPI staff. (See Attachment II for a list of persons serving on these two committees).

## II. THE WORKSHOP PROGRAM

The Workshop program was divided into two parts. The first was devoted to examining scientific and technological policy issues in a less developed economy environment. The second covered institutional management issues. (See Attachment III for the Workshop Agenda).

Several different techniques were employed to convey knowledge, stimulate thinking, develop management judgement, refine decision-making capabilities, and aid interpersonal communications. These included the following :

- The case study method as used in schools of business and management to develop management, judgement, refine interpersonal communications, and practice management techniques.
- Participatory lectures and discussions aimed at conveying knowledge of management principals where the participants were encouraged to contribute to the lectures based on their experience.
- Role playing to develop management judgement and enable the participants to examine issues from the viewpoint of Government officials and clients.
- Analyses of Indonesian research institute programs and problems with institute directors to demonstrate management practice as well as to provide live examples for the participants to analyse and evaluate with respect to selected aspects of R & D management.
- Group and individual exercises and problem solving sessions aimed at further developing interpersonal communication, management, and decision-making capabilities.

The techniques were employed in ways and combinations judged to have the greatest likelihood of achieving the project objectives.

Members of the Steering Committee and the DRI team met on the evening of Tuesday, November 30, to review the workshop and techniques in the light of participants response. A summary of this meeting is presented in Attachment IV. Summaries of the major workshop sessions follow.

Economic Policy and Science and Technology  
in a Less Developed Economy

Presented by Ronald P. Black on 22 November

The point was made that in less developed economies (LDEs) two levels of technology exist side by side with little connection between the two. One was pictured as a modern mid-level technology, such as petrochemical, automobile and small aircraft production, while the other was described as traditional and low-technology in nature. A number of questions were asked regarding the implications of this for the national science and technology (S & T) effort in general as well as, for scientific and technological institutions (STIs) in particular.

The need for industrialization, and, therefore, the transfer of technology, was discussed in terms of the unemployment and underemployment problem in LDEs. It was noted -- by way of a calculation of the availability of investment capital in Indonesia -- that many of the new job places would have to be in the low-technology sector if unemployment and underemployment were not to increase. This led to the suggestion that a focus of STIs should be the low-technology sector.

The impact of economic policy on the demand for science and technology was discussed in terms of import substitution strategies versus export orientation strategies. It was noted that export orientation strategies :

- Create a more competitive environment where industry will be encouraged to cut costs and improve product quality.
- Cause the selection and adaptation of technology appropriate to the local environment, i.e., labor intensive and capable of utilizing local raw materials and intermediate inputs.

These conditions create an industrial demand for the services of an STI, particularly among the mid-level technology industries.

The conditions of a modernizing traditional sector were examined for their implications for S & T and visa versa. This lead to a return

to the earlier set of questions where the participants expressed their views on the dual technology implications for Indonesian STIs.

See Attachment V for a more detailed account of this session.

The S & T Institute and the National S & T System

Presented by Clinton A. Stone on 22 November

This session was designed to introduce and explore the governmental (national) environment in which the institutes function. The primary emphasis was on the government as the determinant of national economic policy - utilization of scarce productive resources to produce, distribute and consume commodities, present and future. Policies which influence the S & T community were discussed at length in preparation for a team exercise to analyze and discuss specific policy issues. National systems for S & T were briefly outlined from the point of view of autonomy versus close relationship to developmental needs.

The participant exercise revealed the following science and technology policy issues (listed in order of importance as viewed by the participants) to be the most critical :

1. The spectrum of science and technology activities in Indonesia ranges from basic research to applied engineering, from high technology to the traditional cottage industry and covers many sectors, agriculture to aerospace, as well, there is a geographic distribution of these activities. Given the present S & T resources and the state of development in Indonesia, is the S & T effort properly distributed across these spectra. If so (if not) why should the balance be retained (changed)? What steps should be taken to maintain (redress) the distribution of effort with minimum negative influence on the S & T community ?
2. Incentives play an important role in motivating increased productivity on the part of institutions and of the people who make up institutions. Does the present system of incentives provide adequate stimulation for continuing increases in S & T productivity?. Considering social, economic and political constraints what incentives are most likely to be effective in furthering S & T productivity. Financial

reward?. Prestige?. Increased responsibility?. Reduction in procedural (bureaucratic) constraints?. Improved facilities?. Other?.

3. Science and technology rely heavily on the individual skills of trained manpower at all levels-policy makers, managers, operating scientists and technicians. Are the S & T skills presently available in Indonesia commensurate with the work to be accomplished?. If not where are the deficiencies and what policies would bring about short term (3-5 years) change?. What direction should education and training take to better meet the S & T needs of Indonesia 5-10 years hence?. Why?.

4. Improved communication between the S & T community and public agencies is an important issue. What type of mechanisms are needed to improve and increase these communications links?. Where does the responsibility lie for such actions?.

5. Given that there is a need for informed, objective and responsible S & T inputs to the highest levels of government decision making, an issue revolves about the form and location this focal point should have to be most effective in providing for the coordination, sponsorship and advocacy of science and technology. What are the various options for Indonesia.

The results of the exercise were presented and discussed on 25 November (See Attachment VI for the result of the participants exercise. The papers presented by the groups in the Indonesian language are available at LIPI).

Research Institutions and Relationships With Industry

Presented by Donald D. Evans on 23 November

Ten external and eleven internal (to the research organization) factors, tending to inhibit favourable industry (and other user

community) relationships, were described and discussed. This was followed by the participants individually rank-ordering these factors in accord with their assessments. Then, in groups of six, they discussed several of the factors and presented their views to the rest of the participants.

The rank-ordering results were consistent with those of similar groups of institute directors in other parts of the world, in past DRI workshops. Among the external inhibitory factors, the three considered most important were :

1. Lack of mutual understanding by research institutions and industry of the nature and purpose of each other's organizations and methods of operation and decision making.
2. Absence, on the part of users, of confidence in the technological skills and experience of the research institutions.
3. The negative influences of the use of power, control and politics by external forces.

The most influential internal factors were viewed to be :

1. Unfavourable compensation schedules for professional staff.
2. Poor physical facilities.
3. Inexperience of the professional staff in dealing with the problems of user communities.

The participants were provided with a paper which presented the author's definitions and assessments of these inhibitory factors. (Donald D. Evans, "Problems of the Integration of Technological Institutes with Industry". Draft Document, Denver Research Institute).

#### Relationships with the External Environment

Presented by Theodore W. Schlie on 23 November

One theory for looking at an organization in relation to its external environment was presented at this session. Taken from

Organization and Environment by Laurence & Lorsch (Homewood Press, 1969), the theory explains why complex organizations must differentiate ("division of labor") in order to respond to their external environment, and how the performance of the organization then relates to subsequent integration efforts on its part. As part of this lesson, the external environment of the Denver Research Institute was shown.

A special part of the total external environment for R & D institutes is the national science and technology environment in which the institutes is embedded. In order to demonstrate the complexity and range of this environment, S & T indicators which have been used in the U.S. were listed, and the complexity of decision-making for S & T - again in the U.S. - were both illustrated through relevant articles taken from the Science of Managing Organized Technology (Cetron & Goldhar (ed), Gordon and Breach, 1970). It was strongly suggested that R & D managers in LDCs need to examine their external S & T environment very carefully in order to manage their own institutes more effectively.

Since most - if not all - of the national S & T environment in LDCs takes place in government, some of the issues which interact between government and the R & D institute were then brought up for discussion. These issues included the level of government (multi-national, national, sub-national) to which the institute was responsible, the organizational location of the institute within government (mission-oriented Ministry, Ministry of Science and Technology, others), relations between politicians/civil servants and the scientific community (e.g. differences in educational background, time horizons, etc.), the funding and direction of R & D by the government (stability of funding, amount of direction or control by government), and government education and training policies for science and technology (foreign vs. local education, PhD vs. MS level, etc.).

Finally, external information systems which might have relevance for R & D institutes in LDCs were discussed. Different kinds of information systems were outlined, and their limitations were covered.

Then different UN and international information systems and U.S. computerized on-line data bases were briefly described. The session ended with a description of DRI's information activities and how they fit into this total information picture.

Providing an Operational Basis for a Research  
Institute (In Indonesia)

Presented by Pietoyo Sukarbowo on 23 November

Most research institutes in Indonesia are established and financed by the Government. Basically, their aim is to perform R & D activities for the advancement of Indonesia's various sectors; as a vital contribution to National Development, as well as for the benefit of individual enterprises or groups of enterprises.

However, it has been observed that many research institutes perform R & D activities without due regard to the primary aim cited. Perhaps this is due to assured government financing. But for whatever reasons, this absence of relevance, results in low productivity in the science and technology sector, and lack of impact of R & D in the development process.

More effort must be expended to reverse this situation, otherwise the government will become more reluctant to attach greater significance to R & D as a factor in the enhancement of national progress. The R & D institutes must make a strong effort to link their activities to the "outside world". The principle of marketing the institutes services among its "customers" should be adopted.

One definition of a research institute's market would be "all individuals, enterprises, or government agencies which could utilize the institutes R & D as an aid in achieving the objectives they have set". Furthermore, a product of a research institute could be described as "all products, services, and activities of a research institute aimed at providing a client with optimal support in his economic and social achievement".

The constraints facing the research institutes are :

- . . Heavy government involvement in R & D priorities and activities, or lack of adequate autonomy.
- . . Inadequate level of appreciation for R & D in the private sector
- . . Low level of absorptive capacity for R & D results among Indonesian enterprises.

In view of the challenge as well as the constraints, an operating basis for a research institute in Indonesia should be derived from the following considerations :

- General :
1. Overall government policy with respect to National Development and set priorities.
  2. General level of socio-economic development of the country and society.
  3. Understanding of international conditions, especially with respect to science and technology, including R & D.
- Specific:
1. State-of-the-art with regard to specific sectors or areas which the research institute serves.
  2. Intentions and priorities of Government with respect to these specific sectors and areas.
  3. The role activities of other research institutes who serve the same sectors or areas.
  4. Insight into the institute's capabilities to perform the necessary services required by the Government and/or other sectors at which its activities are aimed. This includes evaluation of past and present performances of its own performance - - not only as seen from institute's point of view, but more importantly as seen by Government and other clients.

In conclusion, all operations of an Indonesian research institute should be based upon :

1. Conformity and adherence to Government policies and goals.
2. Insights into prevailing socio-economic trends and requirements.
3. Knowledge of own research institute's limitations and capabilities.
4. Maintenance and improvement/of relationships between the research institute and its market.

See Attachment VII for a more detailed account of this session.

#### The Marketing of Technology

Presented by Theodore W. Schlie on 24 November

The session opened by placing the marketing of technology within a context of financing, starting-up, and maintaining a scientific research institution. Different international and aid-related sponsors of institutes in LDCs were mentioned. Particular emphasis was placed on the design of an institute in this process, and a simple organizational design framework was shown. This framework was illustrated by going over an actual design exercise which took place for the Program for Technology Transfer in Central America.

Marketing as a concept to be applied to R & D Institutes was then covered in relation to direct government support or subsidies and the need for organizational growth and maintenance. Marketing as a generalized discipline was then covered in some detail, and materials were provided from several marketing text books. Such concepts as the function of marketing, market strategy, market segmentation, etc. were discussed, and in all cases the transition from marketing in general to the marketing of technology by R & D institutes was emphasized - some principles have more application than others, some are entirely irrelevant.

Some of the issues which an R & D manager might consider with respect to the marketing function were than discussed. An institute has to know its own capabilities and interests in order to market them. Many institutes have internal communications problems and do not know this. The level of marketing in the organization must also be considered - it can be done at the institutes level by top management, at the division level, or at the project level. A fundamentally related issue is whether marketing should be a specialized function within the institute or whether everybody should be involved in it. The R & D manager must understand that marketing is a function which requires time and energy to carry out, and that it takes financial resources to do this. A marketing budget for promotional purposes may have to be established to legitimize this function. Special program funds may be necessary to support initial institute efforts to build up capabilities in a new area in which it wishes to market. Market research was discussed, as well as several institutional and personal problems that may occur in moving an organization to a marketing mode.

In order to illustrate some of the management tools and insights that might be developed in establishing or improving a marketing function, two charts were prepared. One was a self-analysis of the strength and weaknesses of an institute, categorized by market "product" - different kinds of basic research, applied research, and technical services. The second chart listed past, present, and potential clients of the institute, along with several characteristics of the institute-client relationship for each. Workshop participants were asked to fill these out their own benefit - to treat them flexibly as tools rather than as directives. Later in the workshop, these charts were used with DRI as the subject in order to illustrate their utility.

One of the mechanisms which research institutes have frequently used for marketing is the field extension agent. Some of the basic characteristics required of an agent were discussed, along with propositions which have been derived from empirical evidence regarding his/her behaviour. Several specific cases in the use of field extension agents were discussed, including the Georgia Technology Rural Industry Program, the Industrial Analysis Division of the Nigerian Federal

Institute for Industrial Research, and INFOTECCONACYT of Mexico.

Finally, some time was devoted to a discussion of the entrepreneur as a client for the products of a research institute.

### The Role of Institutional Leadership

Presented by Joseph C. Profita on 25 November

The essence of leadership can be expressed in such terms as : points the way, draws people forward, serves with concern, vision, thrust, creativity, contagious drive and motivation, problem sensitivity, decisiveness, faith and trust. Leadership is not headship, nor necessarily a high level of technological or administrative skill.

Variables which have a major effect on the role and the pattern of institutional leadership are :

- Orientation of the Science and Technology Institute (STI)
- Its maturity, and its future goals
- The importance of external contacts
- The environment in which it must exist

The following guidelines were set down regarding the role of institutional leadership :

- Although quantity of leadership to be exerted is open to question, its quality can have a profound effect.
- Leaders of scientific and technological institutes (STI's) can improve their leadership quality through a number of techniques which were presented
- The leader must be many things to many people; a role involving ethical as well as operational tensions. Effectiveness in these relationships is crucial to success of the STI
- The STI director and his colleagues must play a strong leadership role in establishing the institutes priorities and program.

A case example of a successful less-developed economy scientific and technological institute was presented -- namely "the Agricultural Equipment Program of the International Rice Research Institute". The key role of institutional leadership in the success of this institute was evident.

The following case material was distributed as another example of a successful LDC institution.

"Management Development and Productivity Institute Ghana, West Africa".

Government Support and Stimulation of Scientific  
Institutes in Accomplishing Their Jobs

Presented by Clinton A. Stone on 24 November

The role of the institute in providing information and stimulation to the government was given initial emphasis. It is unrealistic to assume that governments will support science and technology without prodding. Tools and mechanisms available to S & T managers in communicating with their government (and staff) were discussed. These included :

- Goals
- Management
- Organization
- Plans (short and long range)
- Budget submission
- Program proposals
- Manpower development
- Incentives
- Other institutes
- Scientific knowledge

Information gathering, analysis and synthesis were put forward as key elements in interacting favorably with government entities.

The focus of the presentation then shifted to government resources which could provide support and stimulation to the STI. Policies, regulations, programs and funds were among the items cited. The remainder of the session centered upon the actions that STI's could take to positively influence the government toward actions beneficial to STI's.

#### Discussion of the Korea Institute of Science and Technology Case

Presented by Donald D. Evans on 20 November

A relatively extensive case study was reviewed by the participants concerning the establishment and operation of the Korea Institute of Science and Technology. The discussion, as it evolved, focused primarily, on these aspects :

1. The factors of KIST's apparent success and their possible uniqueness as to time and place.
2. The size and composition of the KIST organisation and consequent management problems.
3. The technological contributions of KIST and their possible effect on Korea's economic growth.
4. The applicability of the KIST-type solution to the Indonesian situation. The prevailing view was that it is not.

#### Planning

Presented by Donald D. Evans on 26 November

After a preliminary presentation on the place and importance of the planning function in organizations, the principle theme of the

day's consideration - quantitative systems analysis planning methods - was introduced.

Explanations and illustrations were presented of the following :

1. Leontief input-output matrix construction, including methods of estimating future demand pattern based on demographic analysis and projections of GNP growth. Emphasis was placed on the possible impact the Indonesian S & T community could have through providing assessments of changing technology coefficients for matrix insertion, and the possible effects of these on subsequent analyses.
2. The linear programming problem was explained using illustrations the interactions of production, transport, refining and marketing in the petroleum industry. Linear algebraic relationships were expressed with explanation of parameters and other constraints. The generalized geometrix model for planer (two) factor relationships was presented as an aid in understanding the algebraic solution model.
3. The method of computing the present value of planned projects was explained and its utility as a basis for making economic choices from among technical alternatives was illustrated. A classroom exercise in present value analysis was carried out showing the effect of different interest rate assumptions on alternative choices.

Emphasis was placed on the desirability of research institutions developing capability for quantitative economic analysis as a necessary research tool and as a means for achieving more effective relationships with user communities.

#### Organization

Presented by Clinton A. Stone, Benito Kodiyat, and Danubroto  
on Saturday, November 27

Clinton Stone led a case study of a U.S. R & D organization which formed the basis for discussions of traditional organizational concepts.

The reasons one organizes and the benefits/disbenefits of traditional organizations were presented in the light of the need and problems of scientific and technological institutions (STIs). Ways in which to improve and supplement communication in traditional organizations were explored with experiences in U.S. institutions as a guide.

Modern organizational concepts were first approached on the theory that service organizations, and therefore most STIs, received budgets or block grants. Thus institutional performance was not tied directly to customer satisfaction. The management problem for STIs is therefore not efficiency so much as performance and quality - - quality as viewed by the consumer (client).

Management tasks in service, and knowledge organizations were defined to be :

1. More diffuse decision making.
2. Improved communications.
3. Reduced number of organizational interfaces.

The discussion then moved to the key questions that should be posed in evaluating and designing an organization. Four quasi-analytical approaches to answering these questions were presented with tie-ins to the goals and plans of an institution.

Newer concepts such as matrix organizations (already in place in Indonesia), organization by project, decentralized "autonomous" centers and free form groups were discussed. The day concluded with a presentation by Benito Kodiyat of systems analyses techniques applied to organizational problems. Background information on ceramics activities in Indonesia was provided by Danubrot to the participants for a homework assignment in designing an organization for the Indonesian Ceramics Research Institute.

The participants presented the results of their analyses on 1 December and these were discussed and evaluated at that time.

## Control

Presented by Ronald P. Black on 29 November

The speaker began by noting the rationale for control whether it be for an institute or a project within an institute. The relationships and interdependences of control with the other major functional areas of management - - planning, organization, and evaluation - - were then described.

This led into a specific discussion of project control. A case example of a project conducted within a Thai scientific and technology institute (STI) was used to demonstrate the following control techniques :

- . Pert charts
- . Gantt charts
- . Milestones
- . Projected expenditure curves
- . Staff briefings
- . Early report outlines
- . Periodic sponsor reports
- . Monthly expenditure reports

The participants were then asked to consider how these project control techniques might be used in their own institutions.

Following the project control session, a session was held in institutional control. The DRI management information system was described to illustrate institutional control techniques. The institutional incentive program was highlighted as a major institutional control instrument. The requirement of tying staff incentives to productivity was stressed.

In the afternoon, modern control theory research was discussed. Maslow's five levels of human needs, Mc Gregor's X and Y theory, and Blake and Mouton's management grid were related to recent work of Cammann and Nadler published earlier this year in the Harvard Business Review on fitting control systems to managerial style, organizational structures, and staff characteristics. A decision

tree for choosing a control strategy, included in Cammann and Nadler's article, was used to explore appropriate control strategies.

In the last session of the day, the participants analysed a case study based on the National Institute of Science and Technology (NIST) of the Philippines. At the end of the session, the participants used Cammann and Nadler's decision tree to develop a control strategy for NIST.

### Evaluation

Presented by Theodore W. Schlie on 30 November

In covering the topic of evaluation, different perspectives of evaluation were first outlined and different potential dangers of evaluation were described. Special emphasis was placed on the differences between efficiency evaluation and effectiveness evaluation, and on the inter-relationships between them.

After this introductory material, six generalized steps in the process of evaluation were listed and discussed. These included the definition of terms or variables, the operationalizing of variables, the development of indicators, the collection of data, the analysis of data, and the packaging, presentation, and interpretation of results. During this discussion, an exercise was carried out on the definition and operationalizing of terms and the development of indicators utilizing the objective of "development".

Following the discussion, several cases were presented which illustrated different aspects of evaluation. The first case was from a domestic U.S. program to make local governments more technologically innovative; the second was of a Program for Technology Transfer in Central America to transfer technology from and through the Central American Industrial Research Institute to local small to medium-scale industry. Finally, an exercise involving the group was undertaken to come up with an evaluation of this LIPI/DRI R & D Management workshop.

In order to give the participants some personal experience with evaluation concepts, each was asked to develop an evaluation scheme for their own institute, project, or program. After some working time, several of these schemes were presented to the group and discussion resulted.

Finally, a UNIDO manual on Industrial Research Institutes : Guidelines for Evaluation was used as the basis for discussion.

### Environmental Impact of S & T

Presented by Donald D. Evans on 1 December

The evaluation of concern for environmental impacts and attendant legislation and policy at the Federal level in the U.S. was mentioned. Implications for AID programs in Indonesia and other foreign countries were explained in terms of the generation of environmental effect studies and consequent reports and determinations to meet U.S. statutory and policy requirements.

A structure of categories was presented graphically, to describe principal subject areas within which environmental impacts of science and technology may be described and assessed. These are :

1. Land use
2. Water quality
3. Atmospheric effects
4. Natural resources utilization
5. Cultural impacts
6. Socio-economic considerations
7. Health effects

Examples of negative impacts of technological undertakings were provided with regard to each of these categories and their sub-categories (not listed). The difficulty of making assessments and judgements, especially in areas affected by social/cultural value systems and standards, was described.

Finally, the ethical requirements for professional scientists and engineers to reflect concern and work for presentation of environmental values, were described.

## WORKSHOP CONCLUSIONS

### General

There was very wide agency and field of research representation of institutional management at the workshop. This was aimed at obtaining better synchronization and convergence of the R & D efforts to serve national goals. It is believed that this will also help pave the way for successful execution of cross-sectoral projects and programs. The broad representation further assisted in the creation of informal but effective inter-institutional and inter-agency linkages. It also had the advantage of acquainting the participants with a broad spectrum of approaches to and constraints of institutional management within Indonesia and of introducing a broad spectrum of Indonesian management to approaches applied in other countries. The workshop continued the process begun in the LIPI-MOI-DRI workshop in Bandung in 1975, of establishing an environment in which more directed efforts of management assistance will aid more successfully in solving specific institutional management problems and in developing a common management vocabulary which will assist communications among the nation's institutions. Finally, it is believed that the participation of senior management from a broad spectrum of institutions has aided in the generation of an esprit de corps among R & D management in Indonesia.

At the same time, the diversity of participation required a general approach within the workshop. This generality posed some participants with problems of relating general principles to specific problems in their institutions. Also the broad subject area of the workshop, treating the entire spectrum of institutional policy and management functions within a relatively short period, necessitated a fairly superficial treatment of these functions.

The aim in including policy issues in the agenda was to familiarize the R & D managers with the impact national policy can have on institutional matters. A number of participants thought the policy sessions would have been even more useful if Indonesian policy makers could have been included in these sessions.

### Specific

Several observations were made during the workshop concerning the way it was conducted, its content and its acceptance by participants. First, the participants showed general appreciation and agreement regarding the positive benefit of this type of workshop. Second, participation in workshop discussions ranged from very active to rather passive, due perhaps, to the diversity of their backgrounds and thus, their fields of interest. Third, workloads for the participants were judged to be very heavy. The addition of substantial reading assignments each evening probably had marginal utility. Fourth, absorption capacity of participants, in terms of their retention of the substance of workshop sessions, was demonstrated in the results of workshop exercises. Fifth, stress was placed on the participants from the constant requirement to "think" in English and this was noted. Finally, the use of examples and cases from the U.S. and less developed economies of other parts of the world are desirable teaching tools in some instances; however, the development of additional Indonesian cases and exercises would be beneficial.

### WORKSHOP RECOMMENDATIONS

The workshop conclusions lead to the following recommendations :

#### General

The development of R & D management is a continuous activity. The R & D Management workshop-cum-training for senior institutional management, therefore, should be institutionalised and held annually. This would provide for the systematic and planned increase in quantity and quality of senior R & D managers.

The policy portion of the workshop should be retained. However, more involvement and informative assistance should be obtained from BAPPENAS and top Ministerial Officials, particularly with respect to "development" needs. This will encourage better alignment of R & D

activities to ensure more effective pursuit of national objectives and goals which will aid in an increased R & D activity, and interinstitutional cooperation and communication.

It could prove more convenient to hold the policy portion of the workshop as a separate workshop in its own right. However, the participants from R & D institutions should remain the same for both the policy and management portions of the workshop for a given year.

In preparation for the 1977 workshop, the LIPI and DRI project leaders should meet with BAPPENAS and top-Ministerial Officials to aid planning and preparation of future workshops, as well as integrating BAPPENAS and top-Ministerial Officials in the planning of management training for their senior scientific and engineering personnel. The meetings would in addition permit more effective preparation for the policy portion of the workshop.

It is felt that there is a need for the institutionalisation of R & D management development and training which will continuously increase R & D management quality and capability and for the development of new techniques appropriate to the Indonesian setting.

To ensure institutionalisation it is necessary to develop Indonesian management training cadre. It is proposed, therefore, that LIPI either establishes an R & D management research and training unit within its Headquarters or, as an alternative, forms a linkage with an institution already having management training capabilities. The initial step should be the use of experienced R & D managers as lecturers or resource persons at workshops organised by LIPI.

#### Specific

, To ensure the establishment of an environment conducive to solving management problems, at least one more general R & D Management workshop should be held. LIPI should then consider the need to focus the workshops on specific management issues, such as planning or evaluation, or R & D management in a specific area/sector of activity (such as industry) for a year or so. This would allow the participants, presumably having participated in one of earlier

workshops, to delve more deeply into a given area of management LIPI may wish for. These latter workshops would be used to treat actual Indonesian problems or situations.

For future workshops, formal material based on Indonesian institutional experiences should be prepared. An early case should treat an example of "successful" institutional development.

In the future, participants should be selected and workshop materials provided to them in advance of the workshop. This will allow for preparation beforehand and increased effectiveness of the workshops.

In conducting the workshops, time should be allowed for reviewing necessary reading material e.g. case studies immediately prior to the workshop session treating the material.

More opportunities should be provided, during the workshop sessions, for the participants to discuss issues among themselves in the Indonesian language.

Finally, the participants attending this LIPI/DRI workshop should reconvene for a meeting in approximately six months. Here they should review the current workshop and the applicability of the techniques discussed at the workshop. This would hopefully, lead to further suggestions for improving future workshops and the development of mechanisms and techniques applicable to their respective institutions and the Indonesian setting. The meeting should also serve to further cement the linkage established in Lembang among the participants and their institutions.



Peserta Lokakarya I  
Participants of Workshop I  
Lembang, 22 November - 1 December 1976

Attachment I

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
<u>DEPARTEMEN PERINDUSTRIAN</u> Ministry of Industry			
1.	Afandi Dachlan, Ir.	Metallurgical Engineer	Kepala M.I.D.C. Managing Director of Metal Industries Development Centre Jl. Sangkuriang 12, Bandung.
2.	Djoewarni Ali, B.Sc.	Analytical Chemistry	Kepala Dinas Pengujian, Balai Penelitian Kimia Chief, Testing Department Chemical Research Institute Jl. Ir. H. Juanda 9, Bogor.
3.	Rochyati Joedodibroto, Dr.Ir.	Pulp and Paper Technology (Research)	Kepala Divisi Penelitian, Lembaga Penelitian Selulosa Head, Research Division, Cellulose Research Institute Jl. Tamansari 126, Bandung.
4.	Soemarmi Sudardjo, Ir.	Research and Testing in Leather and Chemicals	Kepala Dinas Penelitian dan Pengembangan Ilmiah, Balai Penelitian Kulit Head, Department of Research and Scientific Development, Leather Research Institute Jl. Sokonandi 3, Yogyakarta.

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
5.	Wibowo Moerdoko, Ir.	Textile Chemistry Textile Research Development	Kepala Dinas Penelitian & Pengembangan, Kepala Departemen Kimia Tekstil, Institut Teknologi Tekstil  Director for Research & Development, Institute of Textile Technology Jl. Jendral A. Yani 390, Bandung.
<u>DEPARTEMEN P.U. &amp; T.L.</u> Ministry of Public Works and Electric Power			
6.	Adimar Adin, Ir.	Civil Engineering	Kepala Bagian Tata Usaha Direktorat Direktorat Penyelidikan Masalah Jalan  Executive Secretary, Directorate of Road Research, Directorate General of Highways Jl. Raya Timur 264, Bandung.
7.	Agan Hariman, Ir.	Architecture Housing Urban Planning Development Planning	Kepala Sub-Direktorat Lingkungan Pemukiman, Direktorat Penyelidikan Masalah Bangunan, Direktorat Jenderal Cipta Karya  Chief of Sub-Directorate of Human Settlements, Directorate of Building Research, Directorate General of Housing, Building Planning and Urban Development Jl. Tamansari 84, Bandung.

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
8.	Imam Sugandi, Ir.	Electrical Engineering	Kepala Bidang Perencanaan, Pusat Penyelidikan Masalah Kelistrikan, Perusahaan Listrik Negara (PLN) Head, Planning Division, Electric Power Research Institute, PLN. Jl. Listrik Negara, Duren Tiga Kotak Pos I/KBYT, Jakarta.
9.	Muhd. Muhtadi, Drs.	Sociology	Kepala Bagian Tata Usaha Puslitbang PUTL Executive Secretary, Research & Development Centre Jl. Pattimura 20, Jakarta.
10.	Prasodjo Soerjowidjojo, Ir.	Mechanical Engineering	Staf Ahli, Kabid. Tata Laksana Puslitbang PUTL Senior Staff, Head of Management Service, Research & Development Centre Jl. Pattimura 20, Jakarta.
<u>DEPARTEMEN PERTANIAN</u> Ministry of Agriculture			
11.	Iman Nazeni, Drs., M.Sc.	Chemistry	Sekretaris Badan Penelitian dan Pengembangan Pertanian Executive Secretary, Agency for Agricultural Research & Development Jl. Ragunan 29, Jakarta.
12.	Rusli Hakim, Dr.	Corn Breeder	Wakil Direktur L.P. 3, Pemimpin Proyek Tanaman Pangan Pusat, Pemimpin Proyek Palawija Associate Director, Central Agriculture Research Institute Jl. Merdeka 99, Bogor.

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
<u>DEPARTEMEN HANKAM</u> Ministry of Defence and Security			
13.	Sunaryo, R., dr.	Aerospace Medicine	Kepala Puslitbang HANKAM Chief of Defence Research & Development Pondok Labu, Jakarta Selatan.
<u>DEPARTEMEN PERTAMBANGAN</u> Ministry of Mines			
14.	Alim Dhamari, M.Sc.	Mineral Analyses	Kepala Lab. Kimia dan Fisika Mineral, Balai Penelitian Tambang dan Pengolahan Bahan Galian Chief, Laboratory for Mineral Physics and Chemistry, Mining and Metallurgy Research Centre Jl. Jendra Sudirman 623, Bandung.
15.	Samsa Gandadisastra, M.Sc.	Mineral Processing	Kasi, Pengolahan Bahan Galian, Balai Penelitian Tambang dan Pengolahan Bahan Galian Chief, Mineral Processing Division, Mining and Metallurgy Research Centre Jl. Jendra Sudirman 623, Bandung.

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
<u>DEPARTEMEN PERHUBUNGAN</u> Ministry of Communication			
16.	R. Achmad Mirza, BA.	Research System	Kepala Bidang Pelaksanaan, Pusat Penelitian dan Pengembangan Perhubungan Udara, Badan Penelitian dan Pengembangan Perhubungan  Head, Research System Division, Aviation Research and Development Centre Research & Development Agency, Ministry of Communication Jl. Lembang -0, Jakarta.
<u>LEMBAGA ILMU PENGETAHUAN INDONESIA</u> Indonesian Institute of Sciences			
17.	Djoko Pitono, M.Sc.	Optics Spektroskopi	Kepala Divisi Pelayanan Teknis, Kepala Lab. Optik, Lembaga Instrumentasi Nasional-LIPI  Head of Optics Laboratory; National Institute for Instrumentation, Indonesian Institute of Sciences (LIPI) Jl. Cisit, Bandung.
18.	Mgs. A.H. Komaruddin, Drs.	Public Administration	Kepala Biro Keuangan, LIPI  Head Bureau . Finance, Indonesian Institute of Sciences (LIPI) Jl. Merdeka Selatan 11, Jakarta.

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
19.	Luhulima, C.P.F., M.A.	Modern West-European History	Peneliti, Sekretaris Lembaga Research Kebudayaan Nasional (LRKN)-LIPI  Research Fellow, Executive Secretary National Institute for Cultural Studies, Indonesian Institute of Sciences (LIPI) Jl. Pejambon 3, Jakarta.
20.	Nazir Harjanto, Drs.	Geography/Economics	Pj. Kepala Bagian Koordinasi Ilmiah, Biro Koordinasi dan Kebijakan Ilmiah-LIPI  Acting Head, Science Coordination Division, Bureau of Coordination and Science Policy, Indonesian Institute of Sciences (LIPI) Jl. Teuku Chik Ditiro 43, Jakarta.
21.	Sampurno Kadarsan, Dr.	Zoology	Kepala Museum Zoologicum Bogoriense  Senior Scientist/Head Museum Zoologicum Bogoriense National Biological Institute, Indonesian Institute of Sciences (LIPI) Jl. Ir. H. Juanda, 3, Bogor.
22.	Ig. Suharto, Ir.	Food Technology	Direktur, Lembaga Kimia Nasional-LIPI  Director, National Institute for Chemistry, Indonesian Institute of Sciences (LIPI) Jl. Cisitu, Bandung.

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
23.	Sujatno Birowo, M.Sc.	Oceanography	Pjs. Deputy Direktur Lembaga Oseanologi Nasional Bidang Pembinaan dan Perkembangan Assistant Director, National Institute of Oceanology, Indonesian Institute of Sciences (LIPI) Jl. Aquarium Sunda Kelapa, Jakarta.
24.	Suwarto Martosudirjo, Dr.	Thermodynamics of alloys & metals, physics of metals	Direktur, Lembaga Fisika Nasional-LIPI Director National Institute for Physics Indonesian Institute of Sciences (LIPI) Jl. Cisit, Bandung.
<u>BADAN TENAGA ATOM NASIONAL (BATAN)</u> National Atomic Energy Agency			
25.	Soeparma Hardjosoeidiro, Ir.	Chemical Technology Chemical Engineering	Direktur Pusat Penelitian Atom Pasar Jum'at BATAN Director, Pasar Jum'at Atomic Energy Research Centre Pasar Jum'at, P.O. Box 2, Kebayoran Lama Jakarta Selatan.
26.	Soeroto Ronodirdjo, Ir.	Chemical Engineering	Direktur Pusat Penelitian Tenaga Atom, GAMA, BATAN Director, GAMA Atomic Research Centre Gajah Mada, Yogyakarta.

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
<u>LEMBAGA PENEREANGAN DAN ANTARIKSA</u> <u>NASIONAL (LAPAN)</u> National Aeronautics and Space Agency			
27.	M. Pakpahan, Drs.	System Analysis	Asisten Operasi Proyek Studi Dirgantara LAPAN  Operation Assistant Project Manager to the Aerospace Studies LAPAN Jl. Pemuda Persil 1, Jakarta.
28.	A. Soerjono	Library Science	Sekretaris LAPAN  Executive Secretary LAPAN Jl. Pemuda Persil 1, Jakarta.
<u>UNIVERSITAS SUMATRA UTARA</u> University of North Sumatra			
29.	Abdul Muthalib Sembiring, SH.	Private International Law	Pembantu Dekan III, Anggota Lembaga Penelitian, Fakultas Hukum dan Pengetahuan Masyarakat, Universitas Sumatra Utara  Assistant Dean, Senior Researcher, Faculty of Law and Social Sciences, University of North Sumatra Jl. Universitas 4, Medan.
<u>UNIVERSITAS HASANUDDIN</u> University of Hasanuddin			
30.	Hardjoeno, dr.	Clinical Pathology	Pembantu Rektor, Universitas Hasanuddin  Vice-President, Hasanuddin University Ujung Pandang.

PANITIA PENGARAH  
LOKAKARYA "R & D MANAGEMENT"

STEERING COMMITTEE  
WORKSHOP ON R & D MANAGEMENT

Lembang, Bandung, 22 November - 1 December 1976

Tugu, Puncak (Bogor), 6 - 18 December 1976

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Ny. (Mrs) A.S. Luhulima S.H.,	Kepala Biro Koordinasi dan Kebijaksanaan Ilmiah, Lembaga Ilmu Pengetahuan Indonesia se- bagai Ketua merangkap anggota  Head, Bureau of Coordination and Science Policy, Indonesian Institute of Sciences, Chairperson
Ir. Benito Kodijat	Staf Ahli pada Departemen Perin- dustrian sebagai Wakil Ketua merangkap anggota  Senior Staff, Ministry of Industry, Vice Chairman
Ny. (Mrs) Diti K.Gunawi S.H.	Kepala Biro Personalia, Lembaga Ilmu Pengetahuan Indonesia sebagai Sekretaris merangkap Ketua Panitia Penyelenggara  Head, Bureau of Personnel, Indonesian Institute of Sciences Secretary, concurrently Chair- person of the Organizing Committee
Dr Ir Sampe Tonapa	Kepala Pusat Pengolahan Data dan Statistik, Badan Penelitian dan Pengembangan Pertanian, De- partemen Pertanian sebagai anggota

- Head, Centre for Data Processing and Statistics, Agency for Agriculture Research and Development, Ministry of Agriculture, Member
- Ir Gatoet Soedomo
- Kepala Bidang Bina Program PUSLITBANG  
Aneka Industri dan Kerajinan, Departemen Perindustrian, sebagai Anggauta
- Head, Division of Program Development,  
R & D Centre for Miscellaneous Industries and Handicraft, Ministry of Industry, Member
- Ir Soenarjono Danoedjo
- Kepala Pusat Penelitian dan Pengembangan/Kepala Pusat Pengolahan Data dan Statistik, Departemen Pekerjaan Umum dan Tenaga Listrik, sebagai Anggauta
- Head, R & D Centre and Head, Centre for Data Processing and Statistics, Ministry of Public Works and Electric Power, Member
- Nn (Ms) Sjamsiah Achmad M.A.
- Kepala Biro Hubungan Internasional, Lembaga Ilmu Pengetahuan Indonesia, sebagai Anggauta
- Head, Bureau of International Relations, Indonesian Institute of Sciences Member

PANITIA PENYELENGGARA  
LOKAKARYA " R & D MANAGEMENT"

ORGANIZING COMMITTEE  
WORKSHOP ON R & D MANAGEMENT

Lembang, Bandung, 22 November - 1 December 1976

Tugu, Puncak (Bogor), 6 - 18 December 1976

<b>Ny. (Mrs) Diti K. Gurawi S.H.</b>	Kepala Biro Personalia, Lembaga Ilmu Pengetahuan Indonesia sebagai Ketua Panitia Penyelenggara merangkap Sekretaris Panitia Pengarah
	Head, Bureau of Personnel, Indonesian Institute of Sciences Chairperson, concurrently Secretary of the Steering Committee
<b>Drs. T.J.C. Pasaribu</b>	Pj. Kepala Bagian Pendidikan Biro Personalia, Lembaga Ilmu Pengetahuan Indonesia, sebagai Sekretaris
	Acting Head, Training Division, Bureau of Personnel, Indonesian Institute of Sciences Secretary
<b>Teuku Hainald</b>	Staf, Biro Hubungan Internasional, Lembaga Ilmu Pengetahuan Indonesia, sebagai Anggota
	Staff, Bureau of International Relations, Indonesian Institute of Sciences Member
<b>Nn (Ms) Sri Wahjuni S.S.H.</b>	Staf, Sekretariat Pimpinan, Lembaga Ilmu Pengetahuan Indonesia, sebagai Anggota

	Staff of the Secretariat, Indonesian Institute of Sciences Member
Nn (Ms) Patrice North	Anggauta  Member
Drs. H. Simamora	Staf, Bagian Pendidikan, Biro Personalia Lembaga Ilmu Pengetahuan Indonesia, sebagai Anggauta  Staff, Training Division, Bureau of Personnel, Indonesian Institute of Sciences Member
Tb. Nurdin	Staf Biro Perbekalan, Lembaga Ilmu Pengetahuan Indonesia, sebagai Anggauta  Staff, Bureau of Logistics, Indonesian Institute of Sciences, Member
Pudjonggo	Bendaharawan Lembaga Ilmu Pe- ngetahuan Indonesia, sebagai Anggauta  Treasurer, Indonesian Institute of Sciences, Member

Attachment III

A G E N D A

Upper Echelon R & D Management

Workshop

Lembang, Bandung 22 November - 1 December 1976

Monday, 22 November

09.00 - 10.30 : Official Opening

POLICY ISSUES

10.30 - 11.00 : Workshop Program, Techniques and Methodologies Ronald P.Black

11.00 - 12.30 : Economic Policy and Science and Technology in a Less Developed Economy Ronald P.Black

12.30 - 13.30 : L u n c h

13.30 - 15.30 : The S & T Institute and the S & T System Clinton A.Stone

15.30 - 16.00 : Coffee break

16.00 - 17.30 : S & T Policy Exercise Participants

Tuesday, 23 November

08.30 - 10.30 : Research Institutes and Relationships with Industry Donald D.Evans

10.30 - 11.00 : Coffee break

11.00 - 13.00 : C o n t Donald D.Evans

13.00 - 14.00 : L u n c h

14.00 - 16.00 : Relationships with the External Environment Theodore W.Schlie

16.00 - 16.30 : Coffee break

16.30 - 17.30 : Providing an Operational Basis for a Research Institute (in Indonesia) Piotojo Sukar-bowo

Wednesday, 24 November

08.30 - 10.30	:	The Marketing of Technology	Theodore W. Schlie
10.30 - 11.00	:	Coffee break	
11.30 - 13.00	:	C o n t .	Theodore W. Schlie
13.00 - 14.00	:	L u n c h	
14.00 - 16.00	:	Government Support and Stimulation of Scientific Institutes in Accomplishing Their Jobs	Clinton A. Stone
16.00 - 16.30	:	Coffee break	
16.30 - 17.30	:	C o n t .	Clinton A. Stone

Thursday, 25 November

08.30 - 10.30	:	The Role of Institutional Leadership	Joseph C. Profita
10.30 - 11.00	:	Coffee break	
11.00 - 13.00	:	Discussion of the Korea Institute of Science and Technology Case	Donald D. Evans
13.00 - 14.00	:	L u n c h	
14.00 - 16.00	:	Role playing by participants on important Indonesian science and technology policy issues	Pietoyo Sukarbowo
16.00 - 16.30	:	Coffee break	
16.30 - 17.30	:	C o n t .	

INSTITUTIONAL MANAGEMENTFriday, 26 November

08.30 - 10.00	:	Planning	Donald D. Evans
10.00 - 10.30	:	Coffee break	

10.30 - 11.30	: C o n t .	Donald D. Evans
11.30 - 13.00	: F r e e	
13.00 - 14.00	: L u n c h	
14.00 - 16.00	: C o n t .	Donald D. Evans
16.00 - 16.30	: C o f f e e b r e a k	
16.30 - 17.30	: T h e L e a t h e r R e s e a r c h I n s t i t u t e	Pietoyo Sukarbowo

Saturday, 27 November

08.30 - 10.30	: O r g a n i s a t i o n	Clinton A. Stone
10.30 - 11.00	: C o f f e e b r e a k	
11.00 - 13.00	: C o n t .	Clinton A. Stone
13.00 - 14.00	: L u n c h	
14.00 - 16.00	: C o n t .	Clinton A. Stone
16.00 - 16.30	: C o f f e e b r e a k	
16.30 - 17.30	: O r g a n i s a t i o n C a s e S t u d y a n d E x e r c i s e	B. Kodijat and Danubroto

Monday, 29 November

08.30 - 10.30	: C o n t r o l	Ronald P. Black
10.30 - 11.00	: C o f f e e b r e a k	
11.00 - 13.00	: C o n t .	Ronald P. Black
13.00 - 14.00	: L u n c h	
14.00 - 16.00	: C o n t r o l c o n t i n u e d	Ronald P. Black
16.00 - 16.30	: C o f f e e b r e a k	
16.30 - 17.30	: C o n t .	Ronald P. Black

Tuesday, 30 November

08.30 - 10.30	:	Evaluation	Theodore W.Schlie
10.30 - 11.00	:	Coffee break	
11.00 - 13.00	:	C o n t .	Theodore W.Schlie
13.00 - 14.00	:	L u n c h	
14.00 - 16.00	:	Evaluation continued	Theodore W.Schlie
16.00 - 16.30	:	Coffee break	
16.30 - 17.30	:	C o n t .	Theodore W.Schlie

Wednesday, 1 December

08.30 - 10.30	:	Environmental Impact of S & T	Donald D. Evans
10.30 - 11.00	:	Coffee break	
11.00 - 13.00	:	Organisation Exercise	Participants
13.00 - 14.00	:	Closing ceremony	
		L u n c h	

SUMMARY OF REVIEW MEETING

The discussion opened with consideration of the effectiveness of the various sessions. Stress on the participants from the constant requirement to think in English was noted. The suggestion was made that future workshops provide more opportunities for the participants to talk and discuss issues in Indonesian.

Coffee breaks, class exercises and lunch periods were arranged to provide for communications among the participants but supplementary mechanisms should be considered.

Workloads for the participants were judged to be very heavy. The addition of substantial reading assignments each evening probably had marginal utility. Inclusion of more time for reading during the daily agenda seems advisable in future workshops.

The use of U.S. examples and cases is a desirable teaching tool in some instances. However, the development of additional Indonesian cases and exercises would be beneficial.

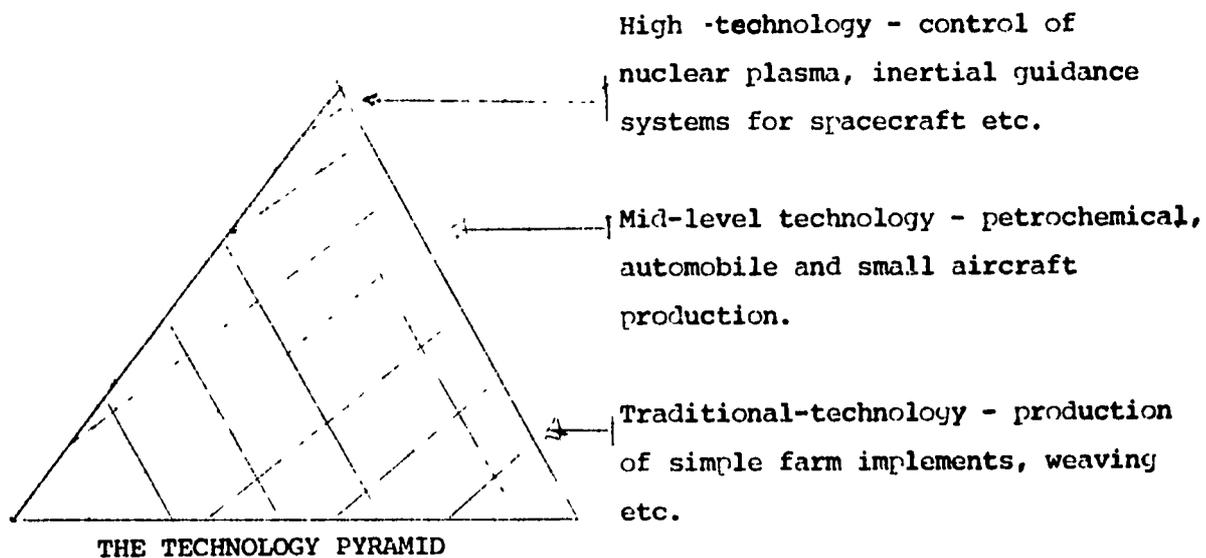
Economic Policy and Science and Technology in a Less  
Developed Economy

Presented by Ronald P.Black on 22 November

1. The two technologies thesis

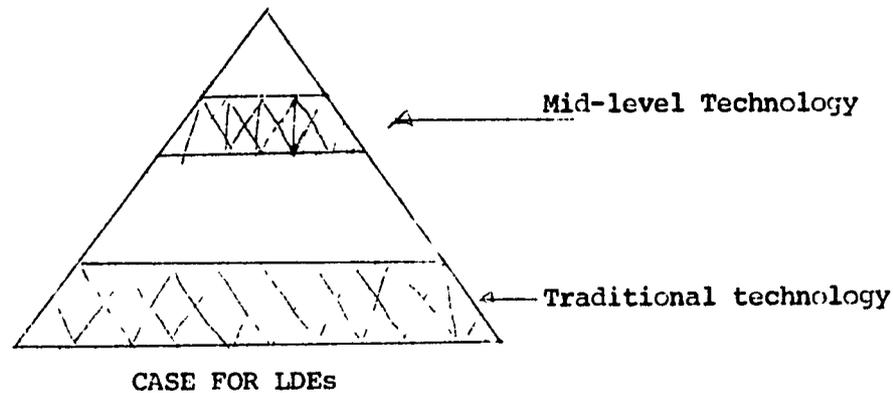
The speaker introduced the session with a conceptualization of world technology as resting on a broad base of traditional and low-technology. With increasing sophistication technology was pictured as rising in the form of a pyramid with high-technology at its pinnacle. See Figure 1.

FIGURE 1.



It was noted that in most less developed economies (LDE's), however, that only parts of the technology pyramid existed - these were pictured as dual technologies existing side by side with little contact between them. See Figure 2.

FIGURE 2

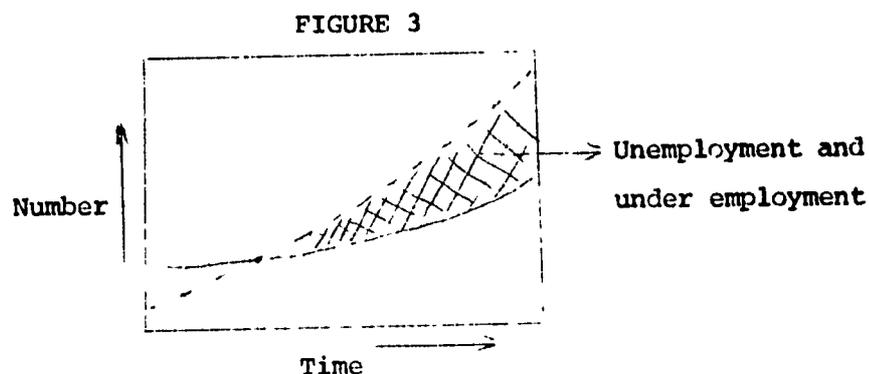


The speaker then asked the participants to consider the following questions for the Indonesian case :

- Are different science and technology institutional spatial arrangements needed to effectively serve the two technology levels ?
- Are different types of extension efforts required to effectively interact with the industrialists of the two technologies ?
- Are different institute staff characteristics needed to effectively interact with the industrialists of the two technology levels ?
- Do the technology levels require different products or types of services from scientific and technological institutes (STIs) ?
- Should there be different emphasis on the level of science and technology (S & T) support supplied to the two technology levels ?
- Are different STIs needed to serve the different technology levels ?

## 2. The need for industrialization in LDEs

The speaker noted that one urgent reason for more rapid industrialization in many LDEs was a growing problem of unemployment and under employment. This was pictured as shown in Figure 3.



\_\_\_\_\_ Number of jobs available for skilled or trained persons  
 - - - - - Number of skilled persons entering the labour market

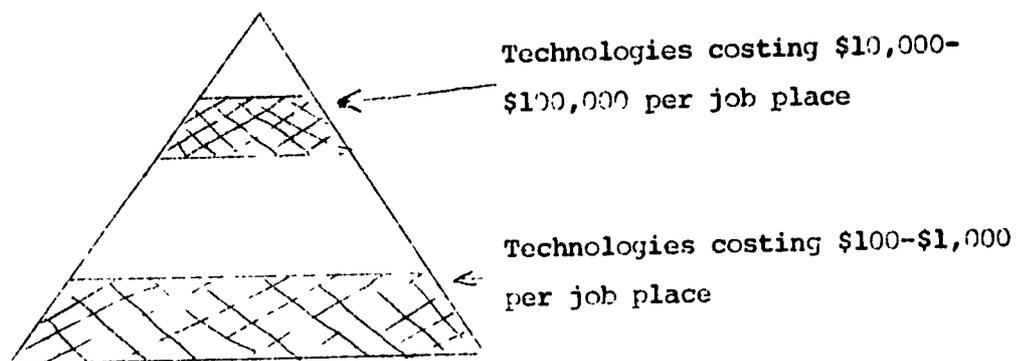
It was noted that, even in countries growing at 5 to 6 percent in real terms, there have been increasing rates of unemployment and under employment.

This has resulted from both rapid population growth rates and increasing availability of education and training opportunities for LDE populations.

The solution to the growing unemployment problem must, in large part, rest on an increased rate of industrialisation. The speaker then suggested that STIs have a large role to play in the technology transfer process that will be required to accomplish more rapid industrialisation.

The question arises, however, as to where in the economy this increased rate of industrialisation should take place. It was noted that the creation of a job place in the middle-level modern technology sector costs in the range of \$10,000 to \$100,000 or more, whereas job places could be created in the low or traditional sector for \$100 to \$1,000. See Figure 4.

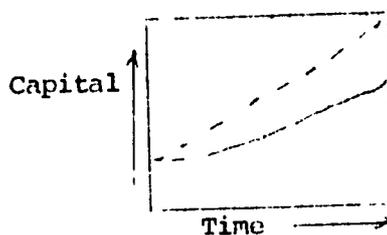
FIGURE 4



COST OF JOB PLACES FOR THE TWO SECTORS OF TECHNOLOGY IN LDEs

It was noted that most LDEs do not have sufficient investment capital available to create the needed jobs by concentrating solely on the mid-level technology sector. The problem was conceptualised as shown in Figure 5.

FIGURE 5



————— Investment capital available to an LDE  
 ----- Investment capital needed for full employment of the newly arriving labour force in mid-level technology jobs

An over emphasis on the mid-level technology sector, the speaker claimed, would lead to heavy unemployment, mass migration to cities where most mid-level technology is located, large slum areas encircling the cities, worsening regional and personal income distributions, and a resultant unrest and discontent among the 85% of the populous that lives in the low-technology sector of the economy.

The speaker then made enough calculation of what the average job place would cost in Indonesia if all new entrants into the labour market were to be employed. This came out to be \$750. Or, another way of saying this is that for each \$50,000 job place created, roughly 100 \$250 job places must be created on the average, for employment of the newly arriving workers. If those presently unemployed are also to be absorbed then, obviously, the average job place will have to cost less than \$750.

It was noted that because of the importance of the low-technology sector, industrialisation in this sector should be a focus of STIs in LDEs.

### 3. Impact of economic policies on the demand for S & T services

The initial economic policy in virtually all LDEs, has been aimed at the substitution of locally produced consumer goods for imported products. This import substitution phase has been necessary to provide time for the development of entrepreneurial capabilities as well as overhead capital, including S & T support structure. At the same time, such a policy has implications for the demand for S & T. This results from the following conditions during the import substitution phase :

- Protected markets with little or no competition
- Assured large profits for protected industries
- Little incentive for industry to lower costs or improve the quality of products
- Capital intensive industry due to undervalued capital, low interest rates and under priced labour
- Little incentive for industry to adapt technology to make it more labour intensive or to adapt it so that raw materials may be substituted for foreign ones
- Little industrial requirement for the services of an STI

These conditions obviously effect how an STI must operate.

Once entrepreneurial capabilities and overhead capital become more developed an LDE reaches the position where it may begin to move into a more competitive export oriented phase. During this phase a government would move to :

- Devalue its currency to more realistic levels
- Liberalise import policy
- Make interest rates higher and more uniform

Such policies will :

- Create a more competitive situation where industry will be encouraged to cut costs and improve product quality
- Cause the selection and adaptation of technology appropriate to the local environment, i.e. labour intensive and capable of utilizing local raw materials and intermediate inputs

These conditions create an industrial demand for the services of an STI. It is at this point that an LDE begins to reap the benefits of its investment in establishing the S & T overhead capital.

The speaker noted two examples of LDEs that have vigorously adapted export oriented policies - Korea and Taiwan. This phase began for Korea around 1964 and for Taiwan around 1959. The results for these countries are shown in Tables 1 and 2.

TABLE 1  
RESULTS OF TAIWAN'S EXPORT ORIENTATION PHASE

	<u>Import Substitution Phase</u>	<u>By 1969</u>
Percent of exports represented by labour intensive industrial products	5	7
Percent growth rate per year	2 - 3	7 - 8
Industrial labour absorption rate per year as a percent	3	8
Distribution of income	poor	much improved

TABLE 2  
RESULTS OF KOREA'S EXPORT ORIENTATION PHASE

	<u>Import Substitution Phase</u>	<u>By 1968</u>
Percent of exports represented by labour intensive industrial products	15	80
Percent growth rate per year	1 $\frac{1}{2}$	9
Industrial labour absorption rate per year as a percent	very low	7
Distribution of income	poor	improved

It was noted that, in the economic environments created in Taiwan and Korea, during their export orientation phases, the conditions existed such that organisations like the Industrial Technology Research Institute (ITRI) in Taiwan and the Korea Institute of Science and Technology (KIST) could flourish and grow while helping industry in their respective countries. The speaker hypothesised that ITRI and KIST would not have nearly the reputations they have today if the governments of Taiwan and Korea had not adopted the policies they did during the 1960's. The interdependency of economic and science and technology policies was noted.

#### 4. Conditions of a modernising traditional sector

It was noted that while the export orientation policies described in the previous section can have a positive effect on both the mid-and low-level technology sectors, it is probably on the former that these policies bring about the greatest change in industry's need for the services of an STI. It is, for example, largely on the mid-level technology and industries that KIST and ITRI have focused.

To aid the participants in understanding better the nature of the S & T effort required to stimulate and assist the traditional sector and visa versa, the speaker used a table from the Edgar Owens and Robert Shaw book; Development Reconsidered. Table 3 shows the Owens - Shaw table with the speaker's comments in the right-hand column (these are indicated by a number)

TABLE 3

Important Characteristics of Stagnant and Modernizing Traditional Sectors

	Stagnating	Modernizing	S & T Implications of Modernizing Characteristics
<u>Characteristics of Local Government and Other Local Organisations</u>			
Organised problem solving system	Inadequate	Adequate	(1)
Decision making authority	Nominal	Considerable	(2)
Financial resources	Limited, essentially static	Considerable and rising	(3)
Written records (for both public and individual use)	Rare, not increasing; people rely on memory	Considerable and increasing; reliance on memory declining	(4)
Leadership positions	Few; number not increasing much	Many; number increasing	(5)

Table 3 - 1 (cont.)

Planned effort to induce transfer of loyalties from traditional to new institutions	No	Yes	(6)
Concept of local development	Individuals, adhoc pro - jects; little emphasis on interrelation- ships	Systems and network; inter- relationships emphasised	(7)
<u>Organisation of Space for Economic Activities</u>			
Organises market towns	No	Yes	(8)
Investment in infra- structure (electricity, transport, storage, land improvement)			
National systems	Adequate	Adequate	
Regional systems	Tends to be adequate	Adequate	(9)
Local systems	Inadequate; often no network	Adequate; built as networks	
Build linkages between national, regional and local levels	Unsystematic and slow	Essentially systematic and rapid	(10)
<u>Policy, Attitudes, Trends Related Production System</u>			
Government believes the poor can pay cost of own improvement	No	Yes	(11)

Table 3 - 1 (cont.)

Price System	Substantial administrative controls	Strong reliance on the "market"	(12)
"Efficiency" generally equated with "bigness" and the latest "machines"	Yes	No	(13)
Subsidised capital investment (which benefits mostly the rich)	Considerable	Little	(14)
Geographic dispersion of industry	Some	Considerable	(15)
Systematic extension of the financial system to local level	No	Yes	(16)
Support of small producers	Little	Much	(17)
Number of investors	Few; increasing slowly	Few in the beginning; rising rapidly	(18)
Income distribution	Inequality	Inequality decreasing	(19)
Un- and underemployment	Rising	Falling	(20)
Tenancy and/or land-reform	Lip service; tax enforcement	Enforced	(21)
Agricultural taxation (land and incomes)	Low	Generally high	(22)
<u>Education</u>			
Rely on formal education system	Yes	Yes	(23)

Table 3 - 1 (cont.)

Willingness to introduce variety of "non-formal" education programmes	Little	Much	(24)
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"The Population Explosion"

Birth rates	High and essentially static	Falling	(25)
Exports (per capita)	Rising slowly, static or falling	Rising rapidly	(26)

- (1) This means modernizing traditional sectors have access to S & T services.
- (2) Nayadama, who was formerly head of the Leather Research Institute in India, has convincingly noted that for the regional centres associated with the Institute to be successful, it was necessary for the regions' leather industries to consider that the centres were their own. The regional leather industry had a considerable influence on what problems the Centre worked on and what services it offered. The regional centres had to have the decision making authority to orientate the Centre's activities to the industry's perceived needs. The speaker noted that he had often heard Pictoyo Sukarbowo of the Indonesian Leather Research Institute also speak of this need for industry to believe that the research institute serving it was its own institute.
- (3) Modernizing traditional sector (MTS) industries can not only do STI services often through industrial association.
- (4) This indicates an increasing reliance on the scientific method by the traditional and low technology industries in MTSS.

- (5) For example, the creation of industrial or trade associations. The association leaders will work with their institute.
- (6) One such institution would be the one providing scientific and technological services.
- (7) The modernizing traditional sector would see the need for networks and the interrelatedness of programmes and the need for coordination. For example, for a new fertiliser plant to be successful in achieving development objectives there would be the :
- Need for roads to carry the fertiliser from the plant to the farm and, in turn, the farm products made possible by the fertiliser from the farm to the market.
  - Need for a credit system that allows the farmer to obtain funds to purchase the fertiliser and perhaps mechanised farm equipment needed to make the enterprise profitable.
  - Need for research institutes to determine the proper fertiliser and mixes for various soils and crops - and to design and develop appropriate agricultural equipment.
- (8) Farmers surrounding the market towns will need S & T inputs to support their agriculture.
- (9) In the modernizing traditional economy, industry has contact with regional S & T centres that are linked to a national centre(s).
- (10) If the regional S & T centre can not solve a local industrial problem, it refers the problem to the national institute.
- (11) Local small-scale industry will support their S & T centre, possibly through an association.
- (12) Modernizing traditional sectors' reliance on "the market" creates competitive pressures that encourage acceptance of S & T services.
- (13) The modernizing traditional sector (MTS) adapts technology to their "cheap labour" environment.
- (14) A small amount of subsidisation encourages adaptation in the modernizing society.

- (15) The considerable dispersion in the modernizing society could be an argument for regional S & T centres.
- (16) In the MTS, the availability of financing aids in the creation of a market for improved small-scale technologies. This was a very important factor in the International Rice Research Institute agricultural equipment development programme's success in the Philippines.
- (17) Such support helps make the small producers a market for the S & T institute's products and services.
- (18) The increasing number of investors means an increasing number of potential clients for an S & T institute.
- (19) The decreasing inequality in income distribution increases markets, particularly for low-technology products thus providing a demand for more S & T services to small-scale industries.
- (20) The falling unemployment in an MTS is partially due to the adaptation of technology to make it more appropriate for a cheap labour/extensive capital environment.
- (21) The MTS condition creates a market for a small-scale mechanisation and therefore the services of an appropriate agricultural equipment development institute.
- (22) The taxes can help to support an agricultural STI.
- (23) The educational system teaches the scientific method.
- (24) The "non-formal" training and education programmes are appropriate services of an S & T institute that focuses on the traditional technology sector.
- (25) This is partially due to better scientific knowledge regarding birth control.
- (26) Rapidly rising exports exist in an environment receptive to the services of an S & T institute.

The examination of the Owens - Shaw table in the light of its implications for S & T completed the speaker's examination of science and technology in less developed economies. He returned to his six initial questions and obtained participants reactions to them in the "Indonesian context".

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RESULTS OF PARTICIPANTS EXERCISE

Issue One

The Spectrum of Science and  
Technology Activities in Indonesia

1. Development activities in Indonesia should be shifted from the agricultural sector to the industrial sector.
2. To enable such a change of emphasis the following two main efforts should be carried out, viz:
  1. to prepare the labour force originated from the agrarian sector in the proper proportion to adapt knowledge and technologies related to the industrial activities (in the first stage: the agro-allied industries) by education and training.
  2. to push the emergence of industrial activities (centres), to create new job opportunities to enable the absorption of ex-agrarian labour force.
3. Understanding that industrial activities are capital intensive, increasing percentage of budget from the G.N.P. should be allocated for these two main efforts.
4. Understanding also, that industrial development needs larger amount of energy, special efforts to conserve energy resources should be carried out, especially the renewable energy resources belonging to the forest system. By shifting the agrarian labour force to the industrial sector will make forest (nature) conservation activities more implementable.
5. These efforts should be well programmed by taking into account the existing conditions in such a way that serious forest imbalances will not be created.
6. Regionalisation of development centres according to the available resources in the region, will facilitate the migration thrust of the ex-agrarian labour force the emerging industries in those regions.

7. The R & D activities should accordingly be spread also into the region to support the emerging industries in those regions.
8. The R & D activities should then be adjusted to meet the needs of the new challenges stated above.

#### Issue Two

#### Incentives in Motivating Increased Productivity in R & D

Every Scientist and Engineer realize that incentives play an important role in motivating increased productivity on the part of institutions and of those who make up institutions.

If we should answer the question: Does the present system of incentives provide adequate stimulation for continuing increase in S & T productivity?, then the answer is simply: not yet.

So, to stimulate the continuing increase in S & T productivity the present system of incentives should be improved, such as :

1. Adequate salaries
2. Formal recognition to Scientist and Engineers who give significant contribution to the research effort.
3. Merit and career planning.
4. Reward, either financial or administration
5. (better) health care and old age security for the scientific staff
6. Insurance, etc.

The above mentioned staff compensations or staff benefits are very important for organizational success.

We are aware that characteristically in government affiliated research institutions in developing countries, one of the greatest inhibitors of quality and performance is the relatively low pay scale that could be afforded the professional staff.

Faced with "civil service - type" pay scales, such institutions could either not attract or keep the level of qualified personnel needed in order to provide adequate technical service, because low salary generally means low quality of staff.

Consequently, to get such improvement goal, the government affiliated R & D institutions should have their own autonomy. By having their autonomy the R & D institutions can arrange the necessary facilities required to improve productivity.

### Issue Three

#### MANPOWER DEVELOPMENT FOR R & D INSTITUTIONS IN INDONESIA

Science and technology relies heavily on the individual skills of trained manpower at all levels: policy makers, managers, operating scientists, technicians and supporting personnel. It has been observed that the quality as well as the quantity of science and technology skills presently available in Indonesia do not commensurate with the work to be accomplished. This situation applies to most sectors. For R & D managers high managerial skill and outstanding academic ability are required. Some of the qualifications for scientists are good academic background, creativity and dedication. With respect to technicians, technical skills and dedication are essential.

The aforementioned situation could be caused by inadequate efforts to improve the quality of the existing personnel and the inability of R & D institutions to attract and retain qualified people. This inability is due to inappropriate incentive systems, and the lack of a favourable working atmosphere. In order to improve this situation, short term and long term programs are required.

The short term program should include:

1. upgrading of existing R & D personnel, directed towards immediate needs, by informal as well as formal training, in this country as well as abroad. Workshops, symposia, seminars are also very valuable in this program.

2. to attract qualified Indonesian personnel from the domestic as well as the foreign market by incentives such as better salaries, adequate facilities, a sound reward system, professional recognition and ability to develop professional abilities.
3. foreign experts could be invited to assist R & D programs, and to train Indonesian personnel.

The long term program should include:

1. improvement of education in general in which imagination, creativity and skills should be stimulated.
2. directing the education to meet the S & T needs of Indonesia to the National Development Plan.

#### Issue Four

#### COMMUNICATIONS BETWEEN THE S & T COMMUNITY AND PUBLIC AGENCIES

Our group feels that improved communication between the S & T community and public agencies is an important issue because:

1. The results of research should be disseminated.  
R & D depends on other public agencies to sell its products to the ultimate consumers. Since most of R & D's are government supported they have to work within the existing organizational structure and the function of extension lies outside R & D.
2. The lack of communication sometimes gives unfavourable and creditability of the existing R & D institution, which will reflect in terms of budget allocation, facilities of the institution.
3. Other public agencies play an important role in dissemination of results and in giving feedback information as to the problems the consumers are facing so that R & D institutions can give priority to the pressing need of the consumers.

4. We realize that R & D should create a favourable environment for researchers in terms of attractive salary, promotion, facilities to work with. Often time it can not be done because of existing policies and regulations. Improved communication can be expected to correct the deficiency.

#### Mechanisms to improve.

1. R & D should be more active in letting other agencies know so that they aware of what the institute are doing and what are the products they have produced through.
  - a. Press release by radio, television and other mass media.
  - b. Providing services for education and training.
  - c. Free charge of circulation, brochures and leaflets of the institutes.
  - d. Exhibition of products.
2. By conducting meetings, seminars, workshops or conferences attended by different professional organisations or other public agencies in charge of disseminating the products of R & D.

#### Responsibility for action

Through a unit in the R & D institution in charge with giving information and training.

#### Issue Five

#### FORM AND FUNCTION OF THE "FOCAL POINT"

Group 5 was given the task of suggesting a location for and the formation of a 'focal point' which could sponsor, coordinate and encourage the R & D activities in Indonesia.

The group thought that until the present time coordination policy, sponsorship and policy to encourage R & D was not yet clear,

so that the implementation of the R & D products could not yet be fully felt to be effective. In order to clarify the functions of coordination, the President has issued a decree SK 45/1973 which authorizes the Minister of State for Research to assist the President in giving direction and in coordinating all R & D activities on a national level, whether in the public or private sectors.

With regard to a 'focal point', this is still in the hands of the President. Every Department and Non Departmental Body still reports its R & D products directly to the President. In view of this fact, the Minister of State for Research cannot execute his task effectively.

The group therefore suggested two possibilities. Either the existing situation is legalised, so that it is the President who gives the results of research and development to the Minister of State for Research in order to be evaluated, or the President is to formulate a mechanism to enforce SK 45/1973.

The group believe that the best way to coordinate all research and development activities in Indonesia is through the enforcement of SK 45/1973.

Providing an Operational Basis for a Research  
Institute (in Indonesia)

by Pietojo Sukarbowo

At present, most research institutes in Indonesia are established and/or financed by the Government. Although the purposes behind their establishment vary a great deal, the primary aim is to perform R & D activities, based upon available Indonesian science and technology for the advancement of various sectors of national development (agriculture, industry, economic infrastructure, health, national security, etc.) and for the benefit of individual or groups of private enterprises.

It has been observed, possibly due to assured government financing, that many research institutes (RIs) perform R & D activities without due regard to the primary aim mentioned above. Many of these activities are institute oriented with little or no correlation to actual development needs and factual problems faced by enterprises.

This absence of relevance results in low productivity of the scientific and technology sector and lack of impact of R & D in the development process.

For the institute's staff itself, prolonged isolation from the "outerworld" could lead to progressive drying-up of scientific freshness and expertise, which in turn reduce the institute's value for society.

Also, it was noted that, continuation of this situation would support further reluctances on the part of the government to attach greater significance to Science and Technology, R & D and RIs in its efforts to enhance national progress -- with the predictable consequences for the scientific and technological sector. Hence more effort should be undertaken to induce greater understanding into the RIs about the necessity of linking their activities to prevailing actual needs outside the institutes. Also, improved linkages, with the "outside world", would be very much in line with the function of an RI, which is basically a service function.

Within the context of facilitating linkages between RIs and would be customers, the principle of effective marketing of RIs products and services should be introduced -- either on a profit or non-profit basis. The marketing should utilize a "customer-orientated" approach rather than "product-orientated" approach. Prerequisites for effective marketing would comprise knowledge about the market itself and the RI own capabilities or products relevant to that market.

One definition of an RI's market would be "all individuals, enterprises or government agencies, which could utilize the institutes R & D as an aid in achieving the objectives they have set".

A product of an RI could be described as, "all products services, and activities of a research institute aimed at providing a client with optimal support in his economic and social achievement".

Insight into the nature of an RI's market and products would help enable a research institute to be more precise in formulating its aims, objectives and targets along with assisting it in accompanying plans of action to accomplish present goals.

Being government institutions or governmental financed research institutes, the RI's markets, aims, objectives and targets are bound by certain constraints. These include general government policy with respect to achieving national progress, present priorities of sectoral development, government financial capabilities and its attitude towards science and technology -- particularly R & D activities. Specially government insistence on running the science and technology sector in the same manner, and utilizing the same procedures, as other government administrative agencies puts a severe strain on the productive ability of an RI.

Other limitations result from the level of appreciation for R & D by the private sector and the state of absorption capability for R & D results by various enterprises.

Hence an operational basis for an RI (in Indonesia) should be derived from the following considerations :

General : 1. Overall Government policy with respect to national development and set priorities.

2. General level of socio-economic development of the country and society.
3. Understanding of international conditions, especially with respect to science and technology, including R & D.

- Specific :
1. State-of-the-art with regard to specific sectors or areas which the RI serves.
  2. Intentions and priorities of Government with respect to these specific sectors and areas.
  3. The role and activities of other RIs who serve the same sectors or areas.
  4. Insight into the institute's capabilities to perform the necessary services required by the Government and/or other sectors at which its activities are aimed. This includes evaluation of past and present performances of its own performance -- not only as seen from an institute's point of view, but more importantly as seen by Government and other clients.

The preceding general considerations should help lead to an insight of the RI's total market as defined above, while specific considerations are required for understanding the market covered by the RI at present.

In an attempt to describe the general and specific factors upon which an RI's activities should be based, the following points were made :

1. Overall (general) Government policy

This policy is presented in great detail in REPELITAS (Rencana Pembangunan Lima Tahun or Five years development plans). Within the REPELITA framework, the Minister of State for Research also sets up short, medium and long term priorities for Scientific and Technological activities, including R & D projects and programmes.

It is advisable for an RI to strive for conformity of their

operations with these government policies in order to obtain acceptance (and financial support).

## 2. General level of socio-economic development

In projecting its course and related activities, an RI should acquire data about the prevailing socio-economic conditions, such as .

- a. Gross National Product (GNP) and Gross Domestic Product (GDP) in order to gain an idea of the present scale of economy.
- b. Break down of the GNP/GDP according to contributions made by the various sectors (agriculture, industry, infrastructure etc.)
- c. Gross National Expenditure on R & D (GERD).
- d. Distribution of the GERD over the various sources of finances and over the sectors in which R & D is performed.
- e. Size of total population and the working population and the number of university graduates and higher technicians to enable estimation of the R & D labour market which the RI has to build upon.
- f. Acquaintance with other established RIs in various sectors and their activities.

## 3. International conditions with respect to science and technology.

Some insight about international conditions and trends could enable an RI to extract substance for submission in their own projects and programmes to the government.

## 4. Sectoral state-of-the-art information.

An RI should undertake to continuously accumulate and access data concerning the sectors it serves. This should include :

- a. Input-output table information, such as --
  - import - export balance
  - total production/output

- projected added value
- investment and government subsidies
- capital and labour intensity

b. R & D expenditures.

c. R & D requirements and performance.

5. Government intentions and priorities.

Knowledge about Government intentions and priorities in sectors the RI serves would promote the institute's efforts to capitalize upon them for the benefit of setting up programmes and in case these intentions and priorities are considered sub-level or inappropriate, the RI could be in a position to exert stimulation to the government to re-align those intentions and priorities.

6. Relevance of other RIs

Attempts to accomplish the above mentioned re-alignments would be very much enhanced if concerted efforts, by several RIs based upon a common goal, could be made.

7. Insight into an RIs own capabilities (and limitations)

Two important considerations for an RI are, one, its resources, structure and outlook and, two, its performance in serving its potential market.

a. Resources, structure and outlook

These consist of

- i. Staff and its scientific level
- ii. Capital intensive equipment
- iii. Financial structure
- iv. Capital intensive/labour intensive orientation of its R & D
- v. Management capabilities
- vi. Internal organisation : - operational
  - financial
  - commercial
- vii. Image.

b. Market performance and position

The following aspects with regard to potential market performance, were cited :

i. Coverage and penetration.

An evaluation of an RI's market coverage could be drawn from :

$$\begin{aligned} \text{Market coverage} &= \frac{\text{number of companies in present market}}{\text{number of companies in potential market}} \times 100\% \\ \text{Segment/sector coverage} &= \frac{\text{number of branches served}}{\text{total number of branches}} \times 100\% \\ \text{Branch coverage} &= \frac{\text{number of clients served}}{\text{total number of potential clients (within that branch)}} \times 100\% \end{aligned}$$

Penetration could be obtained from the ratio of present income (outside the Routine and Development budget) and estimated possible total income from services rendered to the potential market.

ii. Growth of the range of assignments compared to the growth of economy and the GERD. This includes both private and government contributions.

iii. Composition of orders assigned to the institute thus far.

In conclusion it could be remarked that all operational activities of an RI (in Indonesia) should be based upon

- i. Conformity and adherence to Government policies and goals.
- ii. Insights into prevailing socio-economic trends and requirements.
- iii. Knowledge of own RI's limitations and capabilities.
- iv. Maintenance and improvement of relationships between the RI's and its market.

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REPORT  
ON  
INDONESIAN INSTITUTE OF SCIENCES .. DENVER RESEARCH INSTITUTE  
R & D PROJECT MANAGEMENT WORKSHOP

Tugu, Puncak (Bogor) 6 - 18 December 1976

I. INTRODUCTION

This is a report on the Indonesian Institute of Sciences (LIPI) and Denver Research Institute (DRI) "R & D Project Management Workshop" held in Tugu, Puncak (Bogor), between 6 and 18 December 1976. The objective of this cooperative project was to increase the effectiveness of Indonesia R & D project management capabilities through a management training workshop for management of Indonesian R & D agencies, centres and institutions.

The workshop was organized and conducted by LIPI and DRI, with the cooperation of several ministries and non-ministerial agencies. There were thirty-four participants, comprised of project leaders of research agencies, centres, and institutions. These included, the Ministry of Agriculture (MOA), the Ministry of Industry (MOI), the Ministry of Public Works and Electric Power (MOPW & EP), the Ministry of Defence and Security (MOD & S), the Ministry of Mines (MOM), the Ministry of Communications (MOC), the Coordinating Agency for Survey and Mapping (BAKOSURTANAL), LIPI, the National Aeronautics and Space Agency (LAPAN), the National Atomic Energy Agency (BATAN), the University of Hasanuddin, and the University of North Sumatra, (Attachment I is a list of participants). The participants were selected from each participating institute by the director of the agency, centre, or institution to which the participant belonged.

The DRI team was led by Dr. Ronald P. Black and consisted of himself, Mr. Joseph C. Profita, Dr. Clinton A. Stone, and Ms. Virginia S. Coyle. In preparing and conducting the workshop they worked with a "Steering Committee" comprised of members from LIPI, MOI, MOPW & EP, and MOA and an "Organizing Committee" composed of LIPI staff. (see Attachment II for a list of persons serving on these two committees).

## II. THE WORKSHOP PROGRAM

The workshop program was divided into two parts. The first portion focused on the factors facing the project leader from the inception of an idea to the commercialization or utilization of the projects results. The second part related to project management to institutional management. (See Attachment III for the workshop agenda).

Several different techniques were employed to convey knowledge, stimulate thinking, develop management judgement, refine decision-making capabilities, and aid interpersonal communications. These included the following:

- The case study method as used in schools of business and management, to develop management judgement, refine interpersonal communications and practice management techniques.
- Participatory lectures and discussions aimed at conveying knowledge of management principles where the participants were encouraged to contribute to the lectures based on their experience.
- Analyses of Indonesian research institute programs and problems with institute directors and project leaders to demonstrate management practice as well as to provide "live examples" for the participants to analyze and evaluate with respect to selected aspects of R & D management.
- Group and individual exercises and problem solving sessions aimed at further developing interpersonal communication, management judgement, and decision-making capabilities.

The techniques were employed in ways and combinations judged to have the greatest likelihood of achieving the project objectives. Effective utilization of these techniques were aided as a result of participant evaluative responses following each workshop session. Further assistance in conducting this workshop resulted from the Steering Committee DRI evaluation of the Lembang R & D management workshop conducted on 22 November - 1 December 1976.

Summaries of a number of the major workshop sessions follow.

The Research Institute in A Less Developed Economy

Clinton A. Stone, 7 December

The special difficulties faced by scientific and technological institutes (STI's) in developing countries and the difficulties in communicating with foreign experts from developed nations were the basis of initial discussions. The level and breadth of financial support for R & D in the U.S., the underlying educational system, the competitive nature of R & D and degree of popular support were some of the factors which were used to characterize science and technology in the U.S. A related set of conditions were discussed in the context of developing countries. Almost total dependency on government support, limited financial and manpower resources, dual economies with need for advanced as well as intermediate technologies were among the contrasts which were highlighted. Following discussions with the participants about the barriers to communication which the different settings posed, the presentation shifted to the management implications of the developing economy setting. Reasons were set forth to support the contention that R & D management was more important and more difficult in Indonesia. The needs for planning, communicative proposals, project control, project performance, evaluation and reporting were discussed in relation to the Indonesian setting. Participants interaction on these topics was lively. An exercise was conducted to obtain individual rankings of the importance of external and internal constraints to STI performance. The average rankings for the group were reported to the Workshop attendees.

The Project Concept

Ronald P. Black, 7 December

Different activities that could lead to an idea for an STI project were discussed. These included reading journals and trade

publications; communication with colleagues; attendance at seminars, workshops, and trade fairs; discussions with sponsors and visits with clients.

Several idea-generation models were presented and discussed, and illustrated with examples and anecdotal experiences from STI's. The models presented included a researcher-in-isolation model, a researcher-end user model, a researcher-producer end user model, and a national development model.

Finally, criteria for evaluating project ideas and concepts were discussed. A list of these was prepared; and the participants as an exercise, constructed tables indicating the frequency with which the various criteria are used in their own institutes to evaluate ideas. The results of the exercise were presented to the participants in a later session.

#### Planning the Project

Joseph C. Profita, 8 December

At the outset, certain features of project planning were discussed, as follows :

- Inputs and outputs of the R & D process. (The overall setting for project planning was illustrated by an input-output diagram).
- The background of project planning in terms of long-range planning of R & D. The following reference materials were distributed:
  - Article by J.B. Quinn, "Long-Range Planning of Industrial Research". Harvard Business Review, July-August, 1961.
  - Article by N.Jones, "A Systematic Approach to Technological Forecasting", R & D Management, 6 January, 1975.
- The use of feasibility studies in project planning, stressing major areas of emphasis. Also, certain danger areas were identified regarding content and use of feasibility studies.

Then, the session concentrated on detailed methodology for project planning. The flow of work was depicted as a system (in a circular configuration diagram) in terms of : definition of tasks,

procedures to be employed, key elements (costs, quality, reliability, resources, timescales), and the relationship of planning to control as well as to optimization of value.

A case example to illustrate the project planning procedure involves a new magnetic tape transport device to be used in high speed communications. (Source: Taylor, W.J. and Watling, T.P., Successful Project Management, Business Books Ltd., London, 1970). The step by step procedure was presented in brief during the session, and documented for distribution in terms of.

- Project planning outline
- Project planning case example
- Planning tools.

The planning tools included forms for project budget, manpower chart, capital expenditures, and a very brief exposure to P.F.R.T. (Performance Evaluation and Review Technique is treated in the ensuing session on project control).

Throughout the session the importance of real facts and the dangers of "Blue Sky" planning were stressed.

#### Writing the Proposal

Clinton A. Stone, 5 December

A UN document, 'Research Proposals: A Guide for Scientists, Technologists and Research Institutions in Developing Countries' (ST/ECA/187), was distributed as background for this session and as permanent reference material for the participants. The verbal presentation focused on the multiplicity of audiences for R & D proposals and the need to structure the document (s) to serve the unique perspectives of each audience. The policy maker and high level administrator requires a short summary emphasizing the relationship of the project or program to broader ministerial or national goals. Probability for successful completion should also be addressed together with the experience and competence of the proposing entity. Financial and budgetary officials, perhaps

Institute Directors as well, are interested in the proper application of resources, monetary and human. A plan which relates resource inputs to the tasks and objectives is essential to this group of readers. Research directors and scientific peers are most interested in the technical methods and detailed research procedures usually contained in research proposals. Various proposal structure and techniques for communicating with the diverse audiences were discussed.

The secondary use of previous proposals as a part of promotional activities to obtain new clients was introduced. Presently, this approach has limited utility in Indonesia since government ministries and departments provide the bulk of research support. The discussion was concluded with consideration of the proposal requirements of international assistance agencies. USAID and the United Nations were examples used to illustrate a range of styles and format for proposals to foreign assistance groups.

Following the discussion of "Writing the Proposal" the participants were divided into teams for the purpose of preparing expanded outlines of administrative, financial and technical proposals aimed at the utilization of wood-waste from the lumber industry in East Kalimantan. The problem represents an actual one recently presented to MOI institutes.

On completion of the exercise, each team's proposal outlines were discussed.

Developing Research Projects in Response to Industry Needs  
Program

Clinton A. Stone 2 December

This session began with a discussion of the general features which usually characterize ministerial level goals. These goals are often broad and sweeping, covering a national or international need. The goal statements rarely contain quantified objectives.

Often the goals have a strong economic/political are also longer range and may require multiple inputs (programs) for their solution.

Thus the initial tasks for research institutes and project managers, in response to ministry requests, include :

- Translation of Ministry statements into measurable objectives and targets.
- Gathering and analysing information about the sector, the targets and relevant technology.
- Examining the availability of pertinent resources.
- Planning and Documenting Feasible Program/Project Options.

The discussion emphasized the importance of proceeding logically through the sequence above rather than responding with non-targeted proposals.

Difficulties in the process of reducing ministerial goals to feasible and relevant programs was illustrated through an example. The participants participated in an analysis of a paraphrased "ministerial goal".

--- INCREASE THE TRANSFER OF U.S. TECHNOLOGY TO THE DEVELOPING NATIONS ---

After considering the precise meaning of the words, increase - transfer - technology, realistic measurement scales were treated. Types of technology were broadly differentiated into industrial, government and general technical knowledge. The characteristics of each category of technology was discussed in terms of developing country needs, system constraints (in the U.S.), relative costs, etc.

Mechanisms for transfer and the success probabilities for each were then discussed. No attempts was made to reach consensus or absolute objectives. Rather the example was used to illustrate the desirability of such analysis notwithstanding the difficulties involved.

### The Role of Institutional Leadership

Joseph C. Profita, 9 December

The essence of leadership can be expressed in such terms as : points the way, draws people forward, serves with concern, vision, thrust (dynamic active and involvement), creativity, contagious drive and motivation, problem sensitivity, decisiveness, faith and trust. The focus is on people, bringing them out of their problems, moving them on, inspiring them. Leadership is not headship, nor necessarily a high level of technological or administrative skill.

Variables which have a major effect on the role and the pattern of institutional leadership are :

- Orientation of the STI
- Its maturity, and its future goals
- The importance of external contacts
- The environment in which it must exist

The following guidelines were set down regarding the role of institutional leadership :

- Although quantity of leadership to be exerted is open to question, its quality can have a profound effect.
- Leaders of STI's can improve their leadership quality through a number of techniques which were presented
- The leader must be many things to many people and publics; a role involving considerable effort and attention, and involving ethical as well as operational tensions
- The STI Directors and his colleagues must play a strong leadership role in the establishment of the institution's priorities and overall program

An example of a successful LDC STI and some reasons therefore was presented, with the focus on quality of leadership. (The agricultural equipment program of the International Rice Research Institute).

The following reading material was distributed :

- Thomason, G.F., "Managerial Authority and Leadership",  
The Management of Research and Development, B.T. Batsford Ltd.,  
London.
- Steele, L.W., "What's the Boss For?", The R & D Game, M.I.T.  
Press, Cambridge, Mass., U.S.A., 1969.
- McLeod, T.S., "Personal Work-load of a Technical Director",  
Management of Research, Development, and Design in Industry,  
Gower Press Ltd., London, 1969.

#### Project Control Techniques

Clinton A. Stone, Ronald P. Black and Soenarjono Danoedjo

10 December

Traditional task planning/control methods such as task lists Gantt charts and milestone charts were treated by Stone during the initial part of this session. The historical origins of these visual techniques in U.S. manufacturing and production were used to illustrate the limitations of simple linear depiction. The need to express interdependence and the interrelationships between research tasks was stressed. Simple methods for annotating Gantt charts and improving their information content were illustrated.

The role of these simpler techniques in conveying information to administrators and policy makers was pointed out. While more advanced techniques such as PERT, CPM and PFBS are needed to do adequate planning for complex projects, proposals and reports should utilize easily read summary material such as Gantt charts.

Cost accounting also plays an important role in project control. Expense categories delineated by financial and accounting groups do not always correspond to the activities and functions of interest to the project manager. The desirability of receiving cost data which correspond to the critical elements of the project plan. Time lags in cost reporting can defeat attempts to exercise cost control on projects. The advantages of using "obligation reporting" rather than cash flow were discussed. The participants

pointed out the Indonesian requirement to report cash flow in order to receive quarterly financial project allocations. This points up the need for dual accounting systems, one to serve external needs and the other to serve improved project control.

The session then moved to an introduction by Black to the KIST approach to network analysis as an R & D project planning, control and analysis techniques. A number of simple examples, of the use of network analysis, were first presented. The participants were then led through the analysis of an actual nuclear physics project.

In the afternoon, Soenarjono Danodjo compared PERT and CPM providing detailed descriptions of the rules for employing each. The multiple uses of network analysis were illustrated. Finally the participants were led through a PERT exercise.

The following morning the participants were divided into teams, provided a proposal and asked to evaluate it using a network analysis. The results of the teams efforts were examined and then an analysis of the proposal by Black was examined.

#### Writing the Report

Joseph C. Profita, 13 December

The topic of writing the project report was covered in this session, through lecture and discussion, and in the session immediately following, through a report evaluation exercise.

At the outset, the types of reports involved in the management of R & D projects were described as follows :  
Initial survey reports, routine periodic operational reports, progress reports (major milestones, phases), project terminal reports, and special project related reports (e.g. market survey, long-range technological forecast, environmental impact study).

Key points in the process of organizing a report were presented as follows :

- Identify audience/s

- Identify how various audiences are to be reached
- Make an outline early in the project, one that takes its form from a projected table of contents in the final report.
- Use graphics to good advantage.

Some personal questions were raised as follows for the report writer :

- All at once, or in stages?
- Dictated or written by hand?
- What setting, or time of day?
- How to follow the outline?
- Use of informal critics?
- How much to delegate?

Scheduling and implementing the report writing effort was described in schematic form as a process involving assignments, reviews, and often multiple revisions. Final report quality was stressed, and especially these key areas of attention :

- The summary of conclusions and recommendations (purpose, content, length).
- Review and editing (inside, outside, client-carefully)
- Distribution, oral presentation, and supplementary visual aids.
- Follow-up (client-implementation, public interest and press releases, journal articles and talks).

Two exercises were employed for practice in analysis and synthesis of data, and the preparation of clear, concise conclusions and recommendations. Both were taken from the publication, "Business Research and Report Writing".

The following materials were distributed :

- Chapter entitled, "Layout of the Formal Report", from Modern Technical and Industrial Reports.
- Title page and table of Contents of Technical Report Sample (U.N.D.P./I.L.O.).
- J.C. Profita "Public Policies and Expectations of African Countries towards Foreign Business and Investments", Univ. of Houston Conference, October 14 - 15, 1976.

Report Evaluation Exercise

Joseph C. Profita, 13 December

The participants were divided into five groups for this exercise, and a different report assigned to each group for evaluation. The reports represented a wide variety of types, sources, and formats, as follows :

- C.P.I.A. Annual Report (Indonesia Institute of Agricultural Research).
- Strategi Pengembangan Penelitian Tanaman Pangan (Strategy and Development of Food Crops Research).
- Report on Survey of the State of Colorado as a Location for Apparel Manufacture (Denver Research Institute).
- Progress Report from the Brazilian Institute of Science to the F.A.O. Regarding, "Activities in Earth Remote Sensing Surveys in Brazil".
- Report on Research Program on Transferring Technology to the Firm, A Pilot study in Irish Industry (Massachusetts Institute of Technology, Sloan School of Management).

The purpose of this exercise was to give participants practice in the critical evaluation and improvement of report quality, by applying principles and guidelines presented in the prior session on "Writing the Report".

The following criteria were used for this report evaluation exercise :

- Format
- Content
- Writing quality and style
- Clarity of conclusions and recommendations.
- Use of graphics and exhibits
- Is it tuned to the audience
- Possibilities for press releases, journal articles, etc.

ASEAN Soybean Project : Case Study

Rustamsjah, 13 December

See Attachment IV for this case study.

Organizing and Controlling the Project

Ronald P. Black, 13 December

The rationale for project control was described. This led to a discussion of the interdependencies of control with the other major functional areas of management -- organization, planning, and evaluation.

To tie together techniques discussed in earlier sessions, a case example of a project conducted within a Thai STI was presented. The following project control techniques were illustrated by the case :

- Network analysis
- Gantt charts
- Milestones
- Projected expenditure curves
- Periodic expenditure and commitment reports
- Staff briefing's
- Early report outlines
- Periodic sponsor reports
- Monthly expenditure reports

The participants were then asked to consider how these project control techniques might be used in their own institutions.

Commercializing the Research Results

Joseph C. Profita, 14 December

At the outset it was pointed out that commercialization is difficult, is a struggle, at best, even for the leading STI's

in the developed countries. However, it is essential that developing country STI's join the struggle. Their national plans and priorities, and needs (as reflected in low per capita GNP, i.e. Indonesia U.S. \$ 145) make commercialization of research results essential.

A few of the leading STI's in the world (selected for their success in commercializing research results) were discussed:

- The Pasteur Institute (France)
- Stanford Research Institute (U.S.A.)
- Von Karman Institute (Belgium)

their methods of generating income through licences and royalties, and special publications and services were noted.

Stress was placed on the distance, and the long hard road, as well as the resources required in the cycle from basic research to commercial product. These exhibits were used to demonstrate the problem:

- Technological pyramid (L.U. Bass).
- Technological manpower required at each stage of development (U.N.-E.S.C.A.F.).

In this connection it was also pointed out that even the most commercially advanced STI's operate at a great disadvantage in comparison to a successful advanced-technology industrial corporation. The industrial firm possesses the strong advantage of an integrated capability all the way from basic research to the end product in the market-place. (As a case in point the following article was distributed: "How Gould manages innovation," must tediously seek appropriate linkages, to compensate for its product development deficiencies).

The following list of actions was presented which the STI must take in order to commercialize research results, and each action point discussed in order:

- Select projects with focus on the national development plan, outside industrial contacts and surveys, and techno-economic evaluation of opportunities that will increase utilization of indigenous resources.

- Conduct techno-economic feasibility studies that not only serve as a decision-making tool, but also as an instrument for locating users of research.
- Do market analysis and testing as a guide for product design and evaluation (this article was distributed as a resource "Overseas marketing of processed tropical timber", Forum, July-Sept., 1974, UNCTAD, Geneva).
- Employ a formal project system in regard to initiation, implementation, and reports (A specimen client contract form for contracting industrial research was distributed Source U.N. F.S.C.A.P.).
- Employ regular project review and evaluation
- Associate with an industrial partner
- Use demonstration models when there is no venturer in sight
- Establish a national research and development corporation to enhance commercial progress (the United Kingdom HRDC's History and performance was used as an exhibit)
- Use engineering consulting firms as consultants and agents

#### Case Studies - Commercializing Research Results

Joseph C. Profita, 14 December

In support of the prior session, four case studies were treated in order to .

- Illustrate techniques employed in successfully commercializing research results in other parts of the world.
- Select from these cases what might be applied in the Indonesian setting

The participants were organized into four groups and study their respective cases and pick out those features which are applicable to their institution/s in Indonesia. Then, each group was to report their positive commercialization in Indonesia, conclusions and recommendations to the group. Basically, they were asked to select from each of the following cases those

features that offer potential for transfer and adoption in the Indonesian setting.

- The International Rice Research Institute - Agricultural Equipment Program.
- The British Columbia (Canada) Research Council.
- Transferring Technology to the Firm, a Pilot Study in Irish Industry.
- The Korean Institute of Science and Technology.

The groups were asked to write up their conclusions and recommendations, using what was presented in the previous day's session on "Writing the Report".

#### Technical Information

Virginia Coyle, 15 December

In this time of ever expanding and improved communications, information plays an important role and should be considered technology in itself. The availability and access to this vital source of knowledge is a subject of particular interest to developing countries. The purpose of the session was to expose participants to the many sources and systems available around the world. It was not meant that Indonesian institutes should necessarily buy or access all of these. However, as interest, time and money become available, scientists would have some basis or knowledge for choice.

With the many types of information sources available, and many systems even competing with their products, it is difficult nor to feel victim even with some exposure. It was noted that some efforts are being made to coordinate technical information at the world level (see Attachment V) but these efforts are still pretty much in the planning stages. DRI (see Attachment VI) and some other institutions and organizations assisting developing countries attempt to serve as a broker to information and might

select or access those most appropriate. However, ideally, we all strive to be dependent on ourselves and as scientists it is our responsibility to be informed about all of the materials we need and use. It is only with some understanding of the information available, that we can express our needs and assist or direct information specialists to the solutions.

Two types of systems and information related to those were discussed, research oriented, "which provide disaggregated purely scientific or technical information on specific scientific and technical questions," and implementation oriented, "which provide practical answers to "nuts and bolts" questions in the form of semi-aggregated technical-economic-business information," to design engineers, managers and entrepreneurs. In a study for the U.N. Office of Science and Technology James Freeman, DRI, observed that there are a variety of research oriented information systems that seem to be fitting the needs of their clients whereas implementation oriented systems are more difficult to find or access.

In Indonesia, there is a strong interest in the former as a base of technical information is still being built. As in many developing countries there is an increasing interest in implementation oriented information as institutions work to transfer research from the laboratory to the public sector.

A number of examples of different types of research oriented systems and sources were provided. General directories and selected subject sources can be useful in selecting the more relevant systems. (See Attachment VII) some organizations such as UNIDO and VITA try to provide free information of particular relevance to developing countries. (See Attachment VIII). A number of limitations inherent in "free" information must not however be forgotten. Other information systems in specific subject areas were discussed and some examples given of systems indicating an interest in serving developing countries. (See Attachment IX).

Implementation oriented information can be useful to the institute trying to commercialize its results but as well can be packaged and marketed along with research results to small industry. There are a few organizations which might be contacted for training expertise or information for this purpose. (See Attachment X).

Finally, some specialized training for institute people on information and organization of centers is essential no matter how knowledgeable the individual scientist becomes. With information now receiving some of the recognition it deserves, more options (other than traditional library schools) are now open. A number of references to training materials and centres were provided (see Attachment XI) as well a number of systems that might serve as examples of the type of information that can be collected and organized were discussed. Also presented attached diagram (see Attachment XII) indicating the routes that might be taken to the various types of information were discussed.

Information Systems in Indonesia Expose

PDIN - LIPI

Sultanawar, 15 December

See Attachment XIII for the paper presented at this session.

Project Evaluation

Virginia S. Covle, 16 December

It was suggested that all preconceptions and past ideas about evaluation be put aside for this session. So many tend to think about evaluation as a laborious task performed only for a superior. It was emphasized that evaluation should be something positive, a set of activities that yields information which a project manager uses to make decisions.

People have a tendency not to evaluate because they feel it takes money, time and people that must be devoted to the more essential work of a research institute in a developing country. Evaluation however, if set up during the planning stage, should not take away from the other work and in the long run, should save. A list of reasons why evaluation is important were presented and discussed.

There are many scientists who refer to evaluation and its many stages with different terms and a number of these were introduced. A distinction between efficiency and effectiveness evaluation was discussed as well. Whatever the terminology, the concept and process is basic and can be applied to almost any situation. The most important thing to remember is to choose a system that is appropriate to your needs.

There are a number of preliminary steps to evaluation that must be taken during the planning phase of the project. Evaluation is not something you start after you get in trouble nor is it something you just begin doing at a project's end.

The process of evaluation was explained in 5 main stages: (1) establishment of project goals into well defined objectives, (2) translation of objectives into measurable indicators, (3) collection of data, (4) analysis of data and (5) clear and brief presentation of information in a report. Each stage was discussed in detail with primary attention given to the most difficult stages. It is important that measurements be both valid (that is measure what they are supposed to) and reliable, (that is, phrased in a dependable, constant or unbiased way).

Potential dangers one confronts when evaluating were listed, as well as important things to remember. One must keep track of inputs at all times, record intervening variables and unanticipated results. Continual feedback to project workers and imparting the correct image of the word evaluation, are the responsibility of the project manager.

Two different project objectives were presented as examples to demonstrate the flexibility of the evaluation process: (1) training Managers, and (2) improving a process of sugar cane extraction. Some time was spent on translating these objectives into measurable indicators and a number of good suggestions were made by participants. Participants later conducted a similar exercise and presented their results.

### How The Project Fits Into Institutional Planning

Clinton A. Stone, 16 December

As background for this topic, 'management' was described as "The Art of Controlling Change". The research institute and the project managers wish to accomplish change for the better through science and technology. They also wish to improve (change) their management skills.

The analysis of the participant responses to the questionnaire (see Attachment XIV) provided on the opening day of the workshop, was utilized, to discuss the interactions between the participants and their institutes as they viewed them. While approximately 50 percent of the responses indicated that planning was an interface, the replies did not indicate a breadth of inputs to the planning process.

The reasons for planning were restated to provide a basis for discussing the interaction between research projects and institute planning. Items cited included reaching goals, reducing risk, organizing work, estimating resource requirements and establishing progress measurements. The need for goals and objectives was stressed.

The ways in which institute planners consider projects were discussed. Nine different points of view were put forward to characterize the planner. The focus was then shifted to those activities in which the project manager can interact with the planning process in their institute. These include helping to set goals and objectives, communicating the plan to the staff, establishing control and evaluation criteria based upon the plan, helping to evaluate the technical feasibility of the plan, provide information on technical resources required, generation of new ideas, helping to evaluate performance against the plan and assistance in promulgating the plan to clients and sponsors in the government as well as the private sector.

The environmental considerations being applied to AID programs at the planning stage were used to illustrate the interaction between projects and planning, as well as to introduce the topic of environmental constraints in science and technology activities. The AID guidelines

to initial environmental examination were discussed with examples of possible impacts in the areas of land use, water quality, atmospheric, natural resources, cultural, socio-economics and health. The need to include an analysis of possible environmental impacts at the earliest stage of project planning was stressed.

The session concluded with a discussion of appropriate technology and its role in Indonesia. It was pointed out that most developing economies need technologies at all levels of sophistication high technology as well as improvements in traditional technologies. The point made by Pietoyo Sukarbowo at a previous session, that the introduction of technology in a rural setting is more a social problem than a technological problem, was reemphasized. This places stress on careful project planning and on the criteria used in selecting project targets.

The U.S. plan to establish a special institution to support AID efforts to increase the application of appropriate technology were described.

#### Liaison with Clients

Joseph C. Profita, 17 December

The need for improved liaison to bridge the gap between the institutions and their constituencies was cited. Therefore the session concentrated on plans and actions an institution can take to improve its liaison with clients.

First, a question guide for use in planning for improved liaison was presented. An abbreviated version follows:

- What is our institute's service?
- What types of individuals and organizations need or use these services?
- Who are the people within these organizations who influence the use of R & D services?
- Who, also, outside the group or organization?

- Who else might provide the services; and what is the cost and quality?
- Why does each client group use the services?
- Under what conditions, what motivation?
- What are the retardants that must be dealt with?
- Now, what do we have to offer them?
- Who will do this job of liaison on behalf of the institute?

Next, a list of techniques and tools for effective liaison was presented; which can be summarized as follows

- Conduct client analyses and construct profiles. (D.R.I. example distributed)
- Conduct appropriate surveys among client groups
- Offer advisory and consulting services, for a fee
- Offer training programs designed to meet the manpower needs of client groups
- Establish regional extension services as required
- Apply a fee policy, suitably, flexible and geared to "the market"
- Train institute staff in public relationships and interview techniques (an interview technique guide was distributed)
- Establish client contact reports, files, and incentives (where possible)
- Prepare and distribute appropriate institute publications (capability brochures of D.R.I. and the Ghana H.D.P.I. were distributed as examples)
- Publish articles aimed at client constituencies
- Seek opportunities to sit on advisory committees, and to give talks
- Promote associations among client groups
- Create demonstration clients or districts

The second half of the session was devoted to an improved liaison planning exercise. The participants were divided into five planning committees, each headed by a representative of the institution in focus. A varied set of institutions was selected, as follows

- Vegetable Research Center
- Chemical Research Institute

- Directorate of Building Research
- Metal Industries Development Center
- National Institute of Physics

Each group prepared a rough plan outline for improving the selected institution's liaison.

#### How the Project Fits into the Institute's Organization

Joseph C. Profita and Ronald P. Black, 17 December

At the outset Profita pointed out that fitting the project into the institute's organization is often a source of tension and difficulties. The challenge is to give the project its proper support without destroying the effectiveness of the functional or discipline units :

Two resource materials were distributed as a guide to the presentation :

- G. Stuart Monteith, "The Research Organization", R & D Administration, Jllife Books Ltd., London, 1969.
- Bass, L.W., "Technical Task Forces" The Management of Technical Programs, Praeger Publishers, New York, 1965.

The various ways of fitting the project into the institution's organization work described, as follows

- Project (or product) oriented organization.
- Direct Project fit under a discipline type organization.
- Matrix or cross discipline type organization (and the grid variation).
- Task force or team concept (for projects of limited duration, and secondment of personnel for limited share of their time).

It was pointed out that these structural forms are not distinctive, nor opposed, but rather are found in all sorts of combinations in a given institutions as a given time in order to fill the need. Key terms to describe an effective project-oriented organization are organic and dynamic.

After the workshop leader gave several examples of project-oriented organization modes, two of the participants presented examples of matrix type organizations with which they were familiar - a research institute in South America and a university in Indonesia.

It was concluded that the matrix type organization mode is probably more suitable and adaptable for most STI's than other forms. The main constraints are the extent to which manpower can be loaded, and the related problem of staff continuity on the project.

The session closed with a plea for more effective project review meetings as the key communications device in a project-with-discipline type of organization. Meetings should be well planned, make use of networks or other project review tools, and be brief and to the point. They should not be an excuse for lack of clear assignments and fuzzy overlappings, nor a crutch for lack of leadership in decision making.

Following the participatory lecture session, Black led the participants in an examination of a case study of a Southeast Asian Institute's organizational evaluation.

#### How the Project Relates to Institutional Control

Ronald D. Black, 18 December

The session opened with an examination of the project control instruments and techniques discussed in the earlier session on 'Organizing and Controlling the Project'. It was found that the three major areas being controlled were:

- Relevancy
- Quality
- Finances

It was noted that these were also important areas for institutional control.

Next, control instruments and techniques that could be used for controlling relevancy, quality, and finances in an institution were examined. The following were described and illustrated with references to actual examples:

### Relevancy

- Top management reviews.
- Outside advisory committees reviews.
- Controlling body --- such as, a board, a university president, a government agency --- reviews.

### Quality

- Divisional and top management project and program reviews.
- Sponsor and client project and program reviews.
- Divisional and top management reviews of proposals and reports.
- Management reviews of sponsors reactions in terms of additional projects commissioned.

### Finances

- Projected expenditure curves.
- Projected income curves.
- Periodic expenditure and commitment reports.

The influence of the existence of institutional control devices on staff behavior was then examined. This led to a discussion of the influence management style, organizational structure, staff characteristics, and accuracy of control information on the optimum control strategy using a decision tree that appeared in the management literature earlier this year, Cammann and Nadler in Harvard Business Review, January 1976, the participants examined strategies appropriate for their own organizations.

### How the Project Relates to Institutional Evaluation

Virginia S. Coyle, 18 December

The meaning and application of evaluation at the project level was compared with that application at the institution level. The points indicating the importance of evaluation at the project level take on an even more serious dimension at the institution level.

Decisions made by a research institute directly influence the technological development of the country. The effects of evaluation such as good planning, saving of time and cost, and staff security become even more important. It was suggested that research institutes all over the world must begin to take responsibility for results of their work. It is only through evaluation of objectives that one may assess, if the technological change created, introduced development as originally intended.

At the project level, evaluation is an ongoing activity that ceases with a final report. Evaluation at the institution level is an activism that never ends. It can then be used for assessing internal capabilities and matching them with national needs identified through external evaluation.

The process of evaluation discussed in the project evaluation session is one that is appropriate and must be applied at the institution level as well. A checklist for setting up evaluation includes clear organization of finances, well defined objectives, and division of projects into general categories and priority areas. The interdependence of project evaluation and institution evaluation was described in detail. Institution objectives were taken from a case discussed earlier in the workshop to demonstrate how the degree of success of individual projects serve as indicators. The whole is only a sum of its parts, making program evaluation dependent on project evaluation. It is only with accurate information from the project level that one can evaluate an institution. Accurate information, whether good news or bad, must be given. It provides essential knowledge by which an institution can correct its weakness and expand upon its strengths.

#### Workshop Evaluation

Participants, 18 December

At the workshops' closing session, the participants were asked to sum up their evaluations of the **workshop**. The following

participants volunteered their opinions.

Dewa Made Tantera

Dr. Tantera noted that the participants felt the workshop had been a success. He then asked the rhetorical question : Why was this? He noted the following as some of the reasons :

- Participants participation
- Reaction of the Steering Committee and DRI to suggestions made by the participants in the forms handed out at the beginning and during the workshop
- The workshop setting
- The manner in which the workshop was conducted

He summed up by saying the workshop had been useful indeed.

In commenting on the duration of the workshop, he indicated that, because of the intense nature of the workshop, it should not be extended beyond two weeks in similar workshops in the future.

Achiral Sjahrudin

Ir. Sjahrudin noted the inclusion of representatives from the private industrial sector would be useful for future workshops.

Burhamzah

Drs. Burhamzah noted that such workshop was a very good mechanism for creating an esprit de corps among R & D managers in Indonesia. He said, that while some parts of the workshop had not presented new ideas and information to all of the participants the impact, when examined as a whole, was very good.

Darwis Adnan

Mr. Adnan stressed the important role that this type of workshop played in establishing a common R & D management language in Indonesia. He noted that such **workshops** should encourage all Indonesian agencies and institutions to work together

to develop a good nation-wide R & D management system.

Emon Sapardjan

Drs. Sapardjan noted that the participant discussions and interaction during free time had also played an important role in the success of the workshop. He proposed that LIPI keeps track of the impact of the workshop on Indonesian R & D management practices and communicate this to the participants. Further, he suggested that the participants should remain in contact with one another and as a group provide feedback on their successes and problems with various management practices.

He concluded by saying the workshop had been a good experience indeed.

Mr. Surachmat Kusumo

Mr. Surachmat Kusumo noted the success of the workshop, and then offered the following suggestions for future workshops :

- Set aside times during the course of workshop sessions specifically for participant discussions.
- Use films or slide shows to demonstrate R & D management progress in other countries. This would provide a break in the intensesness of the workshop.
- Make field trips to visit local R & D institutions. This would break the monotony of being "cooped-up" in one location for two weeks
- Require more indepth response in the workshop evaluation forms.

He closed by noting that the workshop really had been a success and that LIPI should keep the participants informed on each others progress -- perhaps by way of a newsletter.

Mrs. Achie Luhulima then asked if a participant reunion in approximately six months would be a good mechanism for providing feedback. There was unanimous agreement that this was an excellent idea.

Dr. Black noted that the workshops success was the result of the hard work and active participation of the participants. He thanked them for making it the success it was.

#### WORKSHOP CONCLUSIONS

##### General

There was wide agency and field of research representation of R & D management at the workshop. This was aimed at obtaining better synchronization and convergence of R & D efforts to serve national goals. It is believed that this, along with similar workshops, will also help pave the way for successful execution of cross-sectoral projects and programs. The broad representation further assisted in the creation of informal but effective inter-institutional and inter-agency linkages. It also had the advantage of acquainting the participants with a broad spectrum of approaches to and constraints on institutional management within Indonesia and of introducing a broad spectrum of Indonesian management to approaches applied in other countries. The workshop continued the process, begun in the LIPI-MOI-DPI workshop in Bandung in 1975 and continued in the LIPI-DRI workshop in Lembang earlier this year, of establishing an environment in which more directed efforts of management assistance will meet with success in solving specific institutional management problems and in developing a common management vocabulary which will assist communications among the nation's institutions. Finally it is believed that the participation of project management from a broad spectrum of institutions has aided in the generation of an esprit de corps among R & D managers in Indonesia.

The general approach to project management seemed appropriate to the participants needs. Although the two six-day weeks, with long and intensive sessions everyday, that was necessary to cover the subject area put heavy pressure on the participants,

they bore up well. The "ordeal" the participants underwent may have also aided to their esprit de corps.

### Specific

Several observations were made during the workshop concerning the way it was conducted, its content, and its acceptance by participants. First, the participants expressed a strong belief that the workshop had been a success and a desire for a feedback mechanism on each others progress in employing modern R & D management techniques and practices. Second, participation in workshop sessions and exercises were active indeed. Third, while work-loads were quite heavy, participants bore up well under them. Fourth, the participants capacity to absorb the substance of workshop sessions was demonstrated to be quite high by the results of workshop exercises. Fifth, the use of examples and cases from the U.S. and less developed economies of other parts of the world are desirable teaching tools, however, the development of additional Indonesian cases and exercises would be beneficial. Finally, the Steering Committee - DRI conclusions and recommendations from the earlier Lembang workshop concerning approaches to conducting R & D management workshops in Indonesia were substantially correct. The incorporation of as many of the Lembang recommendations as was possible, at this point in time, contributed to the Tuqu workshop's success.

### WORKSHOP RECOMMENDATIONS

The workshop conclusions lead to the following recommendations.

#### General

The development of R & D management is a continuous process. The R & D management course should therefore be institutionalized and held annually. This would provide for the systematic and planned increase in quantity and quality of R & D project managers.

In preparation for the 1977 workshop, the LIPI and DRI project leaders should meet with PAPPENAS and top-ministerial Officials in planning of management training for the nation's scientists and engineers.

It is believed that there is also a need for the institutionalization of an R & D management development and training capability. This resource could continuously increase R & D management quality and capability and could develop new techniques and materials particularly appropriate for the Indonesian environment. To ensure institutionalization it will be necessary to develop an Indonesian R & D management training cadre. It is proposed, therefore, that LIPI either establish an R & D management research and training unit within its Headquarters or, as an alternative, form a linkage with an institution already having management training capabilities. The initial step should be the use of experienced R & D managers as lecturers and resource persons at future workshops organized by LIPI.

#### Specific

The general nature of the R & D project management workshop should, continue to be the workshop's format. Graduates from this course should participate in senior management workshops.

For future workshops, additional formal material based on Indonesian institutional experiences should be prepared. An early case should treat an example of "successful" project management.

In the future, participants should be selected and workshop materials provided to them sufficient time in advance of the workshop to allow for preparation. This should increase the effectiveness of the workshops.

Recommendations, concerning the conduct of workshops, from the Lembang workshop should continue to influence the conduct of management workshops.

Finally, the participants attending this LIPI-DRI workshop should reconvene for a meeting in approximately six months.

At that time, they should review the current workshop and the applicability of the techniques employed. This would, hopefully, lead to further suggestions for improving future workshops and the development of mechanisms and techniques applicable to their respective institutions and the Indonesian setting. The meeting should also serve to further cement the linkages established at Tugu among the participants and their institutions.

## ATTACHMENTS

- Attachment I : List of participants
- " II : List of persons serving on the Steering Committee and Organizing Committee
- " III : Workshop Agenda
- " IV : Rustamsjah's ASEAN Soybean Project
- " V : Efforts to Coordinate Informations Around the World
- " VI : Office of International Programs, Denver Research Institute, University of Denver Know-How Information Service
- " VII : Examples of Directories
- " VIII : Examples of Information Systems
- " IX : Examples of Information Systems in Specific Subject Areas
- " X : Organizations interested in/or Offering Assistance and "Extension" to Industry
- " XI : Training : Information Center
- " XII : Suggested "Routes" to Finding Information
- " XIII : Information Services for R & D in Indonesia by Zultanawar & Kosasih Prawirasuranti
- " XIV : Summary of Responses to First Day Questionnaire

Peserta Lokakarya II  
 Participants of Workshop on R & D Project Management  
 Tugu, Puncak, 6 - 18 December 1976

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
<u>DEPARTEMEN PERTANIAN</u> Ministry of Agriculture			
1.	Soerjono, R., Ir.	Forest Influences	Kepala Bagian Pengaruh Hutan, Pembantu Pimpinan Proyek Penelitian Hutan.  Division Chief, Forest Research Institute, Jl. Gunung Batu, Bogor.
2.	Surachmat Kusumo, Drs.	Horticulture	Pemimpin Program Nasional Penelitian Sayuran, Pemimpin Proyek Penelitian Hortikultura Jawa Barat, Kepala Cabang L.P.H. di Lembang.  Program Director of Vegetable Research Center, Lembang.
3.	Dewa Made Tantera, Dr.	Plant Pathology, Virus Diseases, Rice Pathology. Rice Research & Production.	Pemimpin Program Penelitian Padi, Litbang Deptan, Kepala Sub Bagian Penyakit Tanaman, LP3 Bogor.  Rice Program Director, Agency for Agric, Research & Development, Plant Pathologist and Head, Plant Pathology Dept., Central Research Institute for Agriculture Jl. Merdeka 99, Bogor.

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
<u>DEPARTEMEN PERINDUSTRIAN</u> Ministry of Industry			
4.	Abdul Ghani, Ir.	Chemical Engineering	Kepala Seksi Penelitian Proses Kimia Balai Penelitian Kimia Bogor Chief, Division of Chemical Processes, Jl. Ir. H. Juanda 5, Bogor.
5.	Anang Lukmana, Ir.	Food Technology	Staf Penelitian, Balai Penelitian Industri Staff of Research Section, Industrial Research Institute Jl. Karanganyar 55, Jakarta.
6.	Doddy Soepardi H.A.R., Ir.	Metallurgical Engineer	Kepala Bagian Pengembangan Industri, MIDC Head, Division of Industrial Development, Metal Industries Development Centre Jl. Sangkuriang 10, Bandung.
7.	Purwanti Kusno, (Ms).	Textile Chemistry	Kepala Seksi Penyuluhan, Staf Peneliti & Staf Pengajar Institut Teknologi Tekstil Chief, Library & Information Service Dept., Institute of Textile Technology Jl. Jendral A. Yani 390, Bandung.
8.	Simorangkir, U, BA.	Finance	Kepala Sub Bidang Programming & Pelaporan, Pusat Penelitian dan Pengembangan Aneka Industri dan Kerajinan Rakyat Senior Staff, Program Division R & D Centre for Miscellaneous Industries and Handicraft Jl. Jendral Su harto 26, Jakarta.

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
9.	Victor Senobua, Drs.	International Relations	Kepala Bagian Tata Usaha, Pusat Penelitian dan Pengembangan Aneka Industri dan Kerajinan Rakyat Chief Administration Division, R & D Centre for Miscellaneous Industries and Handicraft Jl. Jendral Suprpto 26, Jakarta.
10.	Soenaryono, S., Ir.	Chemical Technology (Petroleum Technology)	Kepala Seksi Bahan Bangunan, Balai Penelitian Keramik Chief of Building Material Research Section, Ceramics Research Institute Jl. Jendral A. Yani 392, Bandung.
<u>DEPARTEMEN P.U.T.L.</u> Ministry of Public Works and Electric Power			
11.	Achiral Sjahrudin, Ir.	Telecommunication Engineering	Kepala Seksi Perencanaan Teknik, Bagian Perencanaan Pusat Penyelidikan Masalah Kelistrikan (L.M.K.) - P.L.N. Head, Technical Facilities Planning Section, Planning Division, Electrical Power Research Centre Kotak Pos No. 1/KBYT, Jakarta.
12.	Haryono Soekarnaen, Ir.	Structural Engineering	Kepala Bidang Teknologi Puslitbang Departemen P.U.T.L. Chief, Division of Technology, Centre of Research and Development Jl. Pattimura 20, Jakarta.

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
13.	Joesron Loebis, Ir., M. Eng.	Water Resources Development Hydrology	Kepala Seksi Hidrologi Umum, Direktorat Penyelidikan Masalah Air Chief, Hydrology Section, Institute of Hydraulics Engineering Jl. Ir.H. Juanda 123, Bandung.
14.	Oemar Wazir, Drs.	Civil Engineering	Staf Teknik, Direktorat Penyelidikan Masalah Tanah dan Jalan Technical Staff to the Directorate for Transport & System Research, Directorate of Road Research Jl. Raya Timur 264, Bandung.
15.	Zulkarnaen Aksa, Drs.	- Applied Chemistry - Building Materials	Kepala Seksi Pembangunan & Pengembangan Proses Produksi Bahan Bangunan, Pjs. Kepala Subdit Bahan Bangunan & Konstruksi D.P.M.B. Chief, Section of Construction and Production of Building Materials, Directorate of Building Research Jl. Turangga 7, Bandung.
<u>DEPARTEMEN HANKAM</u> Ministry of Defence and Security			
16.	Darwis Adnan, M.Sc.	General Management System	Kepala Dinas Litbang Min Chief of Administration R & D, Min of Defence and Security R & D Centre Pondok Labu, Jakarta.

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
<u>DEPARTEMEN PERTAMBANGAN</u> Ministry of Mines			
17.	Soedjoko TS, Ir. MSMETE	Metallurgy/Mineral Processing	Kasusi Hydrometallurgi Balai Penelitian Tambang dan Bahan Galian Chief, Hydrometallurgy Section, Mining and Metallurgy Research Centre Jl. Jendral Sudirman 623, Bandung.
18.	Winardjo KS, Ir.	Mineral Processing	Kepala Sub Seksi Laboratorium Pengolahan Bahan Galian, Balai Penelitian Tambang dan Bahan Galian Chief, Mineral Dressing Sub Section, Mining and Metallurgy Research Centre Jl. Jendral Sudirman 623, Bandung.
<u>DEPARTEMEN PERHUBUNGAN</u> Ministry of Communication			
19.	Maruli H. Siahaan, Drs.	Business Economics	Kepala Bagian Badan Penelitian dan Pengembangan Departemen Perhubungan Division Chief, R & D Agency, Ministry of Communication Jl. Lembang 40, Jakarta.
20.	Wharsilo, Drs.	Public Administration	Kepala Bidang Penunjang Pengembangan, Puslitbang Perhubungan Laut Chief, Division of Supporting Services, R & D Centre for Sea Communications. R & D Agency Ministry of Communication Medan Merdeka Tirur 5, Jakarta.

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
<u>BAKOSURTANAL</u> Coord. Agency for Survey and Mapping			
21.	Henny Lilywati, Ir. (Ms).	- Geodesi - Data Processing in Photogrametry	Peneliti, Bidang Aero Triangulasi Aero Triangulation Research Jl. Dr. Wahidin I/11, Jakarta.
22.	Susanto, M., Drs.	Cartography	Sekretaris Deputy Evaluasi Sumber Daya Secretary to the Deputy for Evaluation of Natural and Human Resources Jl. Dr. Wahidin I/11, Jakarta.
<u>LEMBAGA ILMU PENGETAHUAN INDONESIA</u> Indonesian Institute of Sciences			
23.	Burhanuddin, Drs.	Marine Biology/Ichthyology	Kepala Bagian Iktiologi Head Ichthyological Division, National Institute of Oceanology-LIPI Sunda Kelapa, Jakarta
24.	Hans K. Sudjono, Drs.	Applied Physics Magnetism	Ajun Peneliti Lembaga Fisika Nasional-LIPI Research Associate, Material Science Dept., National Institute of Physics-LIPI Jl. Cisit, Bandung.
25.	Muharyan Syamsudin, Ir.	Instrumentation	Wakil Kepala Divisi R & D - LIN-LIPI Deputy Chief, R & D Division National Institute of Instrumentation-LIPI Jl. Cisit, Bandung

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
26.	Nilyardi Kahar, Dr.	Structure and Properties of Polymers	Peneliti, Lembaga Fisika Nasional-LIPI Research Worker, National Institute of Physics-LIPI Jl. Cisit, Bandung.
27.	Ninieck W. Soetjipto, Mrs.	Botany (Plant Taxonomy)	Asisten Peneliti, Lembaga Biologi Nasional-LIPI Scientific Staff Member, National Institute of Biology-LIPI Jl. Ir. H. Juanda, Bogor.
28.	Zultanawar	Library and Documentation	Asisten Direktur Urusan Kepustakaan PDIN-LIPI Assistant Director, National Scientific Documentation Centre-LIPI Jl. Gatot Subroto, Jakarta.
<u>LEMBAGA PENERBANGAN DAN ANTARIKSA</u> <u>NASIONAL ( LAPAN )</u> National Aeronautics and Space Agency			
29.	Emon Sapardjan, Drs.	Remote Sensing Application	Pimpinan Proyek Studi Dirgantara LAPAN Project Manager for Aerospace Studies, LAPAN Jl. Pemuda Persil 1, Jakarta.
30.	Alfred Sitindjak, M.Sc.	Systems Analysis	Asisten Ilmiah Proyek Studi Dirgantara LAPAN Scientific Assistant to the Project Manager of the Aerospace Studies Project LAPAN Jl. Pemuda Persil 1, Jakarta.

No.	Nama / Name	Bidang / Field	Jabatan/Position Alamat/Address
<u>BADAN TENAGA ATOM NASIONAL (BATAN)</u> National Atomic Energy Agency			
31.	F.P. Sagala, Ir.	Mining Exploration	Sekretaris Direktorat Geologi - BATAN Secretary, Directorate of Geological Survey, National Atomic Energy Agency Jl. Indramayu 13, Jakarta.
32.	Suwarno Wiryosimin, Drs.	Radiological Physics (Health Physics)	Sekretaris, PRAB - BATAN Secretary, Bandung Reactor Centre, National Atomic Energy Agency Jl. Tamansari 71, Bandung.
<u>UNIVERSITAS HASANUDDIN</u> University of Hasanuddin			
33.	Burhamzah, Drs. MBA.	Business Administration	Ketua Jurusan Ketatalaksanaan Perusahaan, Fakultas Ekonomi, Lektor Kepala Head of Department Business Administration Faculty of Economy, University of Hasanuddin Jl. Mesjid Raya, Ujung Pandang.
<u>UNIVERSITAS SUMATRA UTARA</u> University of North Sumatra			
34.	Hasudungan S.D. Sianturi, Ir.	Agronomy	Kepala Bagian Bercocok Tanam Perkebunan Fakultas Pertanian USU, - Kepala Bagian Perpustakaan Fakultas Pertanian USU, - Staf Ahli Pusat Riset USU Medan Lecturer at Faculty of Agriculture, University of North Sumatra Jl. Dr. Sofyan 3, Medan.

Attachment II

PANITIA PENGARAH  
LOKAKARYA "R & D MANAGEMENT"  
STEERING COMMITTEE  
WORKSHOP ON R & D MANAGEMENT

Lembang, Bandung, 22 November - 1 December 1976

Tugu, Puncak (Bogor), 6 - 18 December 1976

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Ny. (Mrs) A.S. Luhulima S.H.,

Kepala Biro Koordinasi dan  
Kebijaksanaan Ilmiah, Lembaga  
Ilmu Pengetahuan Indonesia se-  
bagai Ketua merangkap anggota

Head, Bureau of Coordination and  
Science Policy, Indonesian  
Institute of Sciences, Chairperson

Ir. Benito Kodijat

Staf Ahli pada Departemen Perin-  
dustrian sebagai Wakil Ketua  
merangkap anggota

Senior Staff, Ministry of  
Industry, Vice Chairman

Ny. (Mrs) Diti K.Gunawi S.H.

Kepala Biro Personalia, Lembaga  
Ilmu Pengetahuan Indonesia  
sebagai Sekretaris merangkap  
Ketua Panitia Penyelenggara

Head, Bureau of Personnel,  
Indonesian Institute of Sciences  
Secretary, concurrently Chair-  
person of the Organizing  
Committee

Dr Ir Sampe Tonapa

Kepala Pusat Pengolahan Data  
dan Statistik, Badan Penelitian  
dan Pengembangan Pertanian, De-  
partemen Pertanian sebagai  
anggota

- Head, Centre for Data Processing and Statistics, Agency for Agriculture Research and Development, Ministry of Agriculture, Member
- Ir Gatoet Soedomo
- Kepala Bidang Bina Program PUSLITBANG  
Aneka Industri dan Kerajinan, Departemen Perindustrian, sebagai Anggota
- Head, Division of Program Development,  
R & D Centre for Miscellaneous Industries and Handicraft, Ministry of Industry, Member
- Ir Soenarjono Danoedjo
- Kepala Pusat Penelitian dan Pengembangan/Kepala Pusat Pengolahan Data dan Statistik, Departemen Pekerjaan Umum dan Tenaga Listrik, sebagai Anggota
- Head, R & D Centre and Head, Centre for Data Processing and Statistics, Ministry of Public Works and Electric Power, Member
- Nn (Ms) Sjamsiah Achmad M.A.
- Kepala Biro Hubungan Internasional, Lembaga Ilmu Pengetahuan Indonesia, sebagai Anggota
- Head, Bureau of International Relations,  
Indonesian Institute of Sciences  
Member

PANITIA PENYELENGGARA  
LOKAKARYA " R & D MANAGEMENT"

ORGANIZING COMMITTEE  
WORKSHOP ON R & D MANAGEMENT

Lembang, Bandung, 22 November - 1 December 1976

Tugu, Puncak (Bogor), 6 - 18 December 1976

Ny. (Mrs) Diti K. Gunawi S.H.

Kepala Biro Personalia, Lembaga Ilmu Pengetahuan Indonesia sebagai Ketua Panitia Penyelenggara merangkap Sekretaris Panitia Pengarah

Head, Bureau of Personnel, Indonesian Institute of Sciences  
Chairperson, concurrently  
Secretary of the Steering Committee

Drs. T.J.C. Pasaribu

Pj. Kepala Bagian Pendidikan Biro Personalia, Lembaga Ilmu Pengetahuan Indonesia, sebagai Sekretaris

Acting Head, Training Division, Bureau of Personnel, Indonesian Institute of Sciences  
Secretary

Teuku Hainald

Staf, Biro Hubungan Internasional, Lembaga Ilmu Pengetahuan Indonesia, sebagai Anggota

Staff, Bureau of International Relations, Indonesian Institute of Sciences  
Member

Nn (Ms) Sri Wahjuni S.S.H.

Staf, Sekretariat Pimpinan, Lembaga Ilmu Pengetahuan Indonesia, sebagai Anggota

	Staff of the Secretariat, Indonesian Institute of Sciences Member
Nr. (Ms) Patrice North	Anggauta  Member
Drs. H. Simamora	Staf, Bagian Pendidikan, Biro Personalia Lembaga Ilmu Pengetahuan Indonesia, sebagai Anggauta  Staff, Training Division, Bureau of Personnel, Indonesian Institute of Sciences Member
Tb. Nurdin	Staf Biro Perbekalan, Lembaga Ilmu Pengetahuan Indonesia, sebagai Anggauta  Staff, Bureau of Logistics, Indonesian Institute of Sciences, Member
Pudjonggo	Bendaharawan Lembaga Ilmu Pe- ngetahuan Indonesia, sebagai Anggauta  Treasurer, Indonesian Institute of Sciences, Member

Attachment III

A G E N D A

Workshop on R & D Project Management  
Tugu, Puncak 6 - 18 December 1976

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Monday, 6 December

- 09.00 - 10.30 : Official Opening
- 10.30 - 12.30 : Workshop program, techniques and methodologies Ronald P. Black  
Introduction of participants
- 12.30 - 13.30 : L u n c h
- 13.30 - 15.30 : The Indonesian setting Expose
- 15.30 - 16.00 : Coffee break
- 16.00 - 17.00 : C o n t.

Tuesday, 7 December

- 08.30 - 10.30 : The research institute in a less developed economy Clinton A. Stone
- 10.30 - 11.00 : Coffee break
- 11.00 - 13.00 : C o n t.
- 13.00 - 14.00 : L u n c h
- 14.00 - 16.00 : The project concept Ronald P. Black
- 16.00 - 16.30 : Coffee break
- 16.30 - 17.30 : C o n t. Ronald P. Black

Wednesday, 8 December

- 08.30 - 10.30 : Planning the project Joseph C. Profita
- 10.30 - 11.00 : Coffee break
- 11.00 - 13.00 : Writing the proposal Clinton A. Stone

13.00 - 14.00 : L u n c h  
 14.00 - 16.00 : Proposal preparation  
 16.00 - 16.30 : Coffee break  
 16.30 - 17.30 : C o n t.

Thursday, 9 December

08.30 - 10.30 : Developing research projects in response to ministry-level program Clinton A. Stone  
 10.30 - 11.00 : Coffee break  
 11.00 - 13.00 : C o n t.  
 13.00 - 14.00 : L u n c h  
 14.00 - 15.30 : C o n t.  
 15.30 - 16.00 : Coffee break  
 16.00 - 17.30 : The role of institutional leadership Joseph C. Profita

Friday, 10 December

08.30 - 10.00 : Gantt expenditure curve cost accounting Clinton A. Stone  
 10.00 - 10.30 : Coffee break  
 10.30 - 11.30 : Project control techniques PERT Ronald P. Black  
 11.30 - 13.00 : F r e e  
 13.00 - 14.00 : L u n c h  
 14.00 - 16.00 : PERT exercise Soenarjono Danoe-  
 djo  
 16.00 - 16.30 : Coffee break  
 16.30 - 17.30 : C o n t.

Saturday, 11 December

08.30 - 10.30	:	Organizing and controlling the project -- a case example	Ronald P. Black
10.30 - 11.00	:	Coffee break	
11.00 - 13.00	:	Cont. - Group exercise	
13.00 - 14.00	:	L u n c h	
14.00 - 16.00	:	The Indonesian Setting	S.B. Joedono
16.00 -	:	Coffee	

Monday, 13 December

08.30 - 10.30	:	Writing the report	Joseph C. Profita
10.30 - 11.00	:	Coffee break	
11.00 - 13.00	:	Report evaluation exercise	Joseph C. Profita
13.00 - 14.00	:	L u n c h	
14.00 - 16.00	:	Case study (ASEAN Project on Soybean and Protein Rich Food in Indonesia)	Rustamsjah
16.00 - 16.30	:	Coffee break	
16.30 - 17.30	:	Organizing and controlling the project - a case example	Ronald P. Black

Tuesday, 14 December

08.30 - 10.30	:	Commercializing the research results	Joseph C. Profita
10.30 - 11.00	:	Coffee break	
11.00 - 13.00	:	Case studies - Commercializing research results	Joseph C. Profita
		Group exercise	
13.00 - 14.00	:	L u n c h	

14.00 - 16.00	:	The R & D commercialization process in Indonesia	Pietojo Sukarbowo and Sukmono
16.00 - 16.30	:	Coffee break	
16.30 - 17.30	:	C o n t.	

Wednesday, 15 December

08.30 - 10.30	:	Technical information	Virginia Coyle
10.30 - 11.00	:	Coffee break	
11.00 - 13.00	:	Accessing information sources	Virginia Coyle
13.00 - 14.00	:	L u n c h	
14.00 - 16.00	:	Information system in Indonesia	Expose - Zultanawar
16.00 - 16.30	:	Coffee break	
16.30 - 17.30	:	The Indonesian setting	Didin S.Sastrapradja

Thursday, 16 December

08.30 - 10.30	:	Project evaluation	Virginia Coyle
10.30 - 11.00	:	Coffee break	
11.00 - 13.00	:	Evaluation exercise	Virginia Coyle
13.00 - 14.00	:	L u n c h	
14.00 - 16.00	:	How the project fits into institutional planning	Clinton A. Stone
16.00 - 16.30	:	Coffee break	
16.30 - 17.30	:	C o n t.	

Friday, 17 December

08.30 - 10.00	:	Liaison with clients	Joseph C.Profita
10.00 - 10.30	:	Coffee break	
10.30 - 11.30	:	Cont. - Group exercise	

11.30 - 13.00 : F r e e  
13.00 - 14.00 : L u n c h  
14.00 - 16.00 : How the project fits into the institute's organization Joseph C. Profita  
16.00 - 16.30 : Coffee break  
16.30 - 17.30 : Case study (Habusa Case) Ronald P. Black

Saturday, 18 December

08.30 - 10.30 : How the project relates to institutional control Ronald P. Black  
10.30 - 11.00 : Coffee break  
11.00 - 13.00 : How the project relates to institutional evaluation Virginia Coyle  
13.00 - 14.00 : L u n c h  
14.00 - 15.00 : Workshop evaluation  
15.00 - : Closing ceremony

ASEAN Project  
on  
Soybean and Protein Rich Food in Indonesia  
(A Case Study)  
Presented by Roestamsjah, on 13 December

BACKGROUND

The cooperation in the field of science and technology among the five member countries of ASEAN (Association of South East Asia Nations) is aimed at : (i) to promote the cooperation in science and technology to solve the common problems faced within the ASEAN region and (ii) to promote scientific and technological development in the respective member countries. The member countries consist of Indonesia, Malaysia, Philippines, Singapore and Thailand.

The Permanent Committee (PC) on Science and Technology has been established since 1971. It is one of the eleven Permanent Committees formed by ASEAN in various fields, such as trade and industry, tourism, food and agriculture, mass media, socio culture activities, etc. During the period of 1971-1973 the Chairman and Secretariat of the PC on Science and Technology were located in Jakarta, and from 1973-1976 has been in Kuala Lumpur. The PC on Science and Technology holds its meeting once a year, i.e. in Jakarta (1971), Singapore (1972), Yogyakarta (1973), Penang (1974), Bangkok (1975), and the next one would be in Kuala Lumpur (1976). The ASEAN cooperative research projects supervised by the PC on Science and Technology can be grouped into the short term projects (such as the climatic atlas and compendium on climatic statistics), the medium term (standardization, soybean and protein rich food) and the long term (the ERTS data processing, water management, metal corrosion, grain handling and storage of perishable foods).

The decisions made during the PC meetings consist of guidelines as how the projects should be implemented, such as the need to hold ASEAN Expert Meetings as well as the need to establish Sub-Committees to coordinate the project implementation.

With respect to the ASEAN project on Soybean and Protein Rich Food, there were four ASEAN Expert Meetings prior to the formation of the ASEAN Sub-Committee on Protein, i.e.:

- (1) Meeting of ASEAN experts on Soybean Processing and Utilization, held in Bandung, 27-28 September, 1972.
- (2) Meeting of ASEAN experts on Food Protein, Kuala Lumpur, 27-30 November, 1972.
- (3) Meeting of ASEAN experts on Soybean and Protein Rich Food, Kuala Lumpur, 14-17 August, 1974.
- (4) Meeting of ASEAN - AUSTRALIAN experts on Soybean and Protein Rich Food, Kuala Lumpur, 20-21 August, 1974.

The first two meetings can be considered as the preliminary effort to identify the common problems within the ASEAN region and discuss the cooperative approaches to overcome the problems. Each member countries are encouraged to continue doing the suggested area of research, financed by their own budget.

The last two expert meetings were held to prepare an ASEAN cooperative research proposal in the area of Soybean and Protein Rich Food, the implementation of which could be financed by a grant from Australia within the framework of the ASEAN - Australia Economic Cooperation. The ASEAN proposal which was then agreed by the government of Australia, in the order of priorities, consists of the following Sub-Projects :

- Sub-Project I : "Identification, development and utilization of low cost protein rich food for children and other vulnerable groups".
- Sub-Project II : "Processing and utilization of Full Fat Soy Flour".
- Sub-Project III : "Improvement of Fermentation Technology":
  - a. Improvement of Soybean Sauce manufacturing techniques.
  - b. Establishment of ASEAN Microbiological Culture Centre for collection, identification, maintenance and improvement of food microorganism.

It should be pointed out here the role of an Australian expert, as appointed by the government of Australia and agreed by the Expert Meeting to visit the relevant research institutes in each of the ASEAN countries and make a report to the Permanent Committee on Science and Technology before Australia made any commitment on the amount of the grant for the proposed project.

#### ASEAN SUB-COMMITTEE ON PROTEIN

During the Fourth Meeting of the ASEAN Permanent Committee on Science and Technology, held in Penang, October 30 - November 2, 1974, several decisions were made with respect to the implementation of the ASEAN Project on Soybean and Protein Rich Food.

It was decided to establish an ASEAN Sub-Committee on Protein to coordinate the implementation of the cooperative research project. In this respect each of the ASEAN member countries should appoint a National Body which would coordinate the activities in the respective member countries and send its representative to be the member of the Sub-Committee. The terms of reference for the Sub-Committee which was recommended by the Permanent Committee and then agreed by the first Sub-Committee Meeting (held in Bangkok, November 25-30, 1974) can be briefly stated as follows : (i) determine the format of the details of the project proposals to be submitted and the constraints to be applied to the proposals, (ii) to recommend to the ASEAN Permanent Committee on Science and Technology on the details of countries participation in each project, the allocation of available funds and resources among the various ASEAN projects, new allocation of funds whenever necessary; and the need of an advisor for the project, (iii) evaluate the progress of the three projects by holding regular meetings, at least twice a year.

At present the institutes or national bodies of the ASEAN member countries having their representative at the Sub-Committee are :

- (i) National Institute for Chemistry,  
Indonesian Institute of Sciences (INDONESIA)

- (ii) Agricultural Product Utilization Branch,  
Malaysian Agricultural Research and Development  
Institute (MALAYSIA)
- (iii) Food and Nutrition Research Institute,  
National Science Development Board (PHILIPPINE)
- (iv) Department of Chemistry,  
University of Singapore (SINGAPORE)
- (v) Institute of Food Research and Product Development,  
Kasetsart University (THAILAND)  
Thailand representative is now Chairman of the Sub-  
Committee.

It was also decided by the PC that the grant has been confirmed to be of the total of A\$ 2,500,000. The guidelines set by the PC are that it should not be for setting up new laboratories or new regional laboratories, but can be used for procurement of equipment, chemicals, journals, training, travel expenses for seminars and meetings and personnel under special circumstances.

In apportioning the allocation among the ASEAN member countries, the first meeting of the ASEAN Sub-Committee decided the following :

Indonesia	: A\$ 530,700.-	
Malaysia	: A\$ 379,800.-	
Philippine	: A\$ 375,000.-	
Singapore	: A\$ 275,000.-	
Thailand	: A\$ 439,000.-	
	<hr/>	A\$ 2,000,000.-

Personnel (5% to the above allocation used under special circumstances)	A\$ 100,000.-
Contingency fund (uncommitted)	A\$ 400,000.-
	<hr/>
TOTAL	A\$ 2,500,000.-

Due to the limited fund, Indonesia has decided to participate only in project I and project IIIa and IIIb.

Concerning the PC recommendation to the SC to consider the need of a non-voting advisor, then at the first meeting of the SC it was agreed to have an Australian Liaison Officer (ALO). Then the Australian government appointed one of its expert to be the ALO.

The terms of reference of this ALO was set at the second meeting in Singapore (April 23-25, 1975) and he would be stationed in Kuala Lumpur, Malaysia. His duties in brief is to assist the Sub-Committee, the National Committees and the Project Leader of the ASEAN Countries in the various aspects of project implementation (such as preparation of equipment specification, examining tender for equipment, collaboration with other related ASEAN bodies engaged in similar activities etc.).

#### IMPLEMENTATION OF THE ASEAN PROJECT IN INDONESIA

After the first Meeting of the ASEAN Sub-Committee on Protein, it has already been confirmed that Indonesia would only participate in project I and project IIIa and IIIb with the total allocated budget of A\$ 530,700.- + A\$ 26,535.- = A\$ 557,235.-

This grant is considered to be as supplement to the existing research activities.

#### Relevancy of the ASEAN Research Project and the Government Approval.

The justification whether the implementation of this project is in line with the National Plan should be clearly stated and obvious.

This is considered very important in seeking the formal approval from the Government of Indonesia, i.e. from the BAPPENAS (Agency for National Development Planning), SETKAB (Cabinet Secretariat) and Ministry of Research. The main points of the justifications are the following : (1) protein deficiency is the one of the national nutrition problem, (2) stability of the food price and nutrition improvement is considered important as stated at the second PELITA, (3) the protein research has a high priority according to the list of priorities of research areas set by the Minister of Research, (4) the implementation of project would promote the cooperation between the participating research institutes, and (5) the project would increase the national research

capabilities especially in the area of food and protein research. The formal approval from the Indonesian Government was then obtained, so that clearance of the equipment already delivered and the disbursement of the fund from the Australian Embassy needed for the project implementation can be done immediately.

It should be noted here that the existing procedures of getting the government approval are generally applied for the technical aid under the bilateral agreement. The LIPI, especially the Bureau of International Relation, has overcome this matter successfully.

Equipment Procurement. The SC has decided that procurement of equipment up to A\$ 5,000.- would require the approval of the Australian Development Assistance Agency at the local Australian Embassy. The expenditure on items in excess of A\$ 5,000.- should be proceed through the Australian Tender Board, situated in Bangkok, Manila and Singapore. Each Board is composed of three members of the local Australian Mission (Embassy), including the Head of the Mission. The Australian Liaison Officer could assist in drawing up detailed specification, which include servicing facilities, compatibility with other models, availability etc. The ALO visited Indonesia on June 21-July 2, 1975 and September 1-4, 1975 for the tender preparation and the preparation of recommendations of the tender to the Tender Board.

The tender of equipment are for the five institutes from the eight participating institutes. The equipment arrived gradually until today, and the first one was arrived during the first quarter of 1976. Some of the equipment has been installed and already in operating conditions.

Institutional Cooperation. There are eight research institutes participating in this ASEAN Project in Indonesia. Many disciplines are involved in the project, such as food technology, agriculture, chemistry, nutrition, etc. In the development of the institutional cooperation, the management of the project implementation should

be as such that : (i) it should not hinder the respective auto - activities of the participating institutes as well as the auto - activities of the research workers, (ii) the creation and development of favourable cooperation and coordination among the institutes, (iii) the optimization of the results by applying the best or potential capabilities within each institutes, (iv) the development of cooperation between the institutes in developing the research capabilities in Indonesia with emphasis on the area of food and protein.

The names of the eight institutes as located in Jakarta, Bogor, Bandung and Yogyakarta are as follows :

- (1) National Institute for Chemistry,  
Indonesian Institute of Sciences, Bandung
- (2) National Biological Institute,  
Indonesian Institute of Sciences, Bogor
- (3) Nutrition Research Institute, Unit Diponegoro,  
Department of Health, Jakarta
- (4) Nutrition Research and Development Centre,  
Department of Health, Bogor
- (5) Faculty of Technology and Mechanization of Agricultural  
Products, Bogor Institute of Agriculture, Bogor
- (6) Biotechnology Team,  
Bandung Institute of Technology, Bandung
- (7) Faculty of Agriculture,  
Gadjah Mada University, Yogyakarta
- (8) Technical Faculty,  
Gadjah Mada University, Yogyakarta

Since October 1974 until the end of 1975 there were more than six meetings held at the National Institute for Chemistry, Bandung, attended by representatives of the eight institutes to work out an efficient and workable mechanism for coordinating the research activities. As the result of those meetings a project organization chart and procedures of the project implementation concerning preparation of research proposals to be carried out by the respective institute, the reporting of progress research activities and of financial matters were established.

The apportionment of the research activities has been quite a problem, but it was solved when a detailed program for 1976 was completed in which each institute has their commitment to do their research activities. The steps which were followed was by inventorisation of the resources ( especially manpower and equipment available ) by circulating a form of data to be filled by the research workers of the institutes. This form requires mentioning the educational background, experience as well as field of interest, papers published or presented in seminars, and the time available for doing ASEAN research activities. This form filled by the research worker should be signed and approved by the director or the head of their institute. This form and also formal letter of participation from the institute can be considered as the formal commitment of the participating institute which is important in preparing the draft of apportionment of the research activities.

Organization of the Project. Although the PC and SC recommend every country to establish a National Committee it was considered unnecessary to establish a new Committee in Indonesia due to the unfavourable existing procedures.

In the ASEAN forum, the Indonesian National Committee for the project is chaired by the Chairman of the Indonesian Institute of Sciences (LIPI) and since June 1975 the Director of the National Institute for Chemistry-LIPI has been appointed by the Chairman of LIPI as the project leader. Besides, a "project committee" was also established to assist the project leader in setting up guidelines, monitoring and evaluation of project implementation and solving problems which may arise. It should be mentioned here that the Chairman of this project committee is the project leader himself, and the secretary of the committee is the Indonesian representative of the ASEAN Sub-Committee on Protein. At present the members of the project committee consist of the chairman, secretary and other three members (two professors from Bandung Institute of Technology and Gadjah Mada University and the other member is the head of the Bureau of International Relation-LIPI).

In optimizing the efficiency of the project implemented for 1976 and 1977 it was decided necessary to breakdown Project I into four Sub-Project, so that in total in Indonesia there are six Sub-Projects each headed by a Sub-Project Leader.

The six Sub-Projects are :

- (I.1) : National survey on Soybean and Soybean food Product
- (I.2.a) : Fermented Low cost protein rich food
- (I.2.1) : Non-Fermented low cost protein rich food
- (I.3) : Evaluation and implementation of low cost protein rich food product
- (III.a) : Improvement of Soybean Sauce manufacturing techniques
- (III.b) : Establishment of ASEAN Microbiological Culture Center for collection, identification, maintenance and improvement of food microorganism

It should be mentioned that this ASEAN project has promoted the cooperation and involvement of 53 research workers from the eight participating institutes.

The organization chart is presented Appendix 1 and the distribution of personnel as Appendix 2.

#### ADMINISTRATIVE ASPECTS

General. The research workers participating in the implementation of the ASEAN project in Indonesia should be registered and approved by the project leader and the head or director of the institute. For each sub-project there is one institute's representative which act as a contact person in charge of coordinating the implementation of the particular sub-project in the institute.

In selecting the personnel, certain rules has been set - the project leader, members of the project committee and the treasurer are not allowed to hold the position either as the sub-project leader or the institute's representative. Also, the sub-project leader is not allowed to become the institute's representative. The research worker which are interested in participating more than one sub-project would only receive the reward for one activity.

Correspondence. To assure that communication barrier be minimized, correspondence between the institute representatives requires the sending of copies to the sub-project leader and the institutes involved. Also letters from the institute's representative to the sub-project leader requires copies to be sent to the project leader and the institutes involved. Letters from the sub-project leaders to the Project leader requires the sending of copies to both institutes involved. Formal letters to Australia and other ASEAN Countries concerning the project implementation should be made only by the project leader and in this case copies should be sent to the Chairman of the National Committee.

Research Planning. The rules in the aspect of research planning requires that all institute's representatives for each sub-project submit a one-year research program to the sub-project leader based on the Indonesian proposal as approved by ASEAN.

After the sub-project leader discuss the proposals with the institute's representatives, the final (or integrated) proposal should then be submitted to the project leader. The project leader together with the project committee evaluate all the sub-project proposals before the project leader give the approval of the research program.

Financial disbursement and reports. The annual budget is requested by the sub-project leaders to the project leader according to the approved annual program. The disbursement of the total annual budget of the project are arranged by the project leader with the Australian Embassy, and the distribution to the institutes are arranged and approved by the project leader. The actual disbursement of the fund are done through the treasurer directly to the sub-project leader as well as to the institute's representatives. The progress of the budget expenditure are made regularly (monthly) by the institute's representative to the treasurer, but it must be approved by the sub-project leader. The same rule applies for the sub-project leader, which should report the state of expenditure to the treasurer and should be approved by the Project Leader.

It should be noted here that the amount of honorarium for the personnel is arranged in such a way that certain rules are followed in accordance with the amount of duties and the responsibilities of the personnels within the organization of the project.

Reporting of Research Activities. The quarterly progress report of research activities in each institute is prepared for each sub-project by the institute's representative, it is directed to the sub-project leader with copies to the project leader. Then, the sub-project leader submit an integrated report from the institute's representative to the project leader. The detailed format as well as the deadline of report submission was discussed and agreed at the inter-institutional meeting.

#### DISCUSSION

From the inter-institutional cooperation side, there are several conditions that affect the actual implementation of the rules which has been established together by the institutes. It can be said that each institute has their own internal rules of the game and therefore the management is such that the communication between the sub-project leader and the institute's representative for each sub-project become very important for the succesful progress of the sub-project.

The project leader and the project committee should constantly monitor the progress by communicating the sub-project leaders and the institute's representatives.

The factor of the institute location, spread in four different cities, Bandung, Bogor, Jakarta and Yogyakarta would create additional communication problems besides the existing general handicaps.

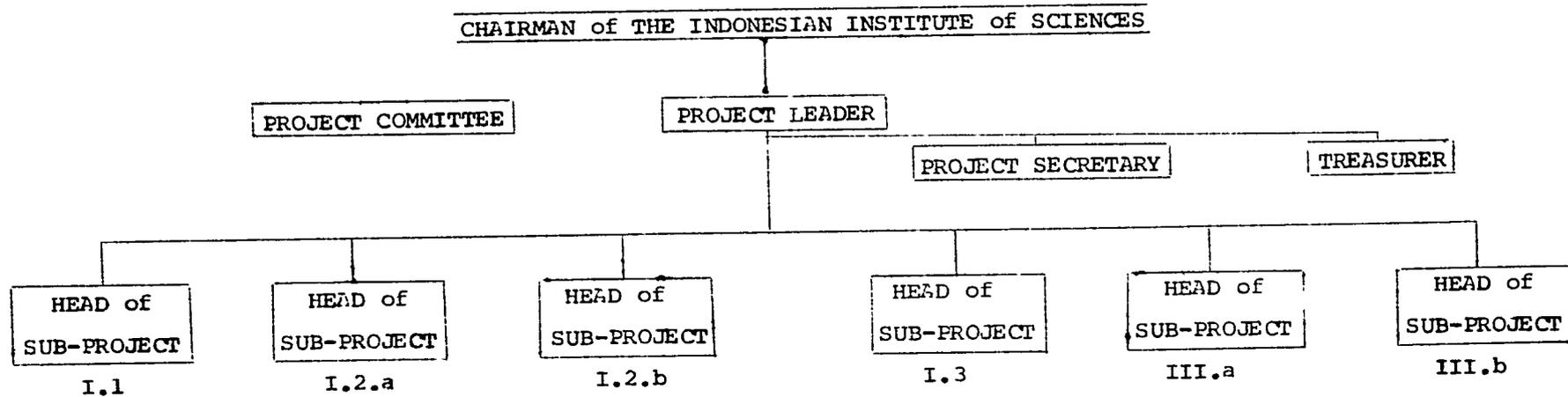
Some of misunderstandings would sometimes require the immediate personal visit of the sub-project leader to the institute. This would certainly need the allocation of the budget for the sub-project leader to overcome the communication problem.

The delay in the first budget disbursement and the delay in the equipment clearance and equipment installation has affected the research

Appendix 1

ORGANISATION CHART of A S E A N PROJECT on SOYBEAN and PROTEIN RICH FOODS

in I N D O N E S I A



- HEAD of SUB-PROJECT I.1
1. FATEMETA
  2. FT-UGM
  3. GIZI-Dipn
  4. GIZI-Sem
  5. BIOTEK-ITB
  6. LKN-LIPI

- HEAD of SUB-PROJECT I.2.a
1. BIOTEK-ITB
  2. LKN-LIPI
  3. GIZI-Dipn
  4. FATEMETA

- HEAD of SUB-PROJECT I.2.b
1. LKN-LIPI
  2. GIZI-Dipn
  3. FT-UGM

- HEAD of SUB-PROJECT I.3
1. LKN-LIPI
  2. GIZI-Dipn
  3. GIZI-Sem

- HEAD of SUB-PROJECT III.a
1. LKN-LIPI
  2. FP-UGM

- HEAD of SUB-PROJECT III.b
1. LBN-LIPI
  2. FP-UGM

NOTE :

- FATEMETA : Faculty of Technology and Mechanization of Agricultural Product. Bogor Institute of Agriculture, Bogor.
- FT-UGM : Technical Faculty, Gajah Mada University, Yogyakarta.
- GIZI-Dipn : Nutrition Research Institute, Unit Diponegoro, Department of Health, Jakarta.
- GIZI-Sem : Center of Nutrition Research and Development, Department of Health, Bogor.
- LKN-LIPI : National Institute for Chemistry, Indonesian Institute of Sciences, Bandung.
- BIOTEK-ITB : Biotechnology Team, Bandung Institute of Technology (ITB), Bandung.
- FP-UGM : Faculty of Agriculture, Gajah Mada University, Yogyakarta.
- LBN-LIPI : National Biological Institute, Indonesian Institute of Sciences, Bogor.

schedule. The enthusiasm of the research workers are very much affected when there was delay in the first budget disbursement.

The cooperation between the research workers in this project can be considered as the starting point to build up a more effective and a more long lasting cooperation, so that the cooperation can exist using the ordinary development budget and independent of the foreign technical aid. It is expected that similar cooperative effort in the planning stage of the research program of the institutes can be developed in the near future.

#### SUMMARY

As a summary to this case study, a PERT chart of the main activities of the project implementation since the First Meeting of the Sub-Committee until the effective start of the project is presented as Appendix 2.

This PERT chart is presented to give the overall main activities from the research management point of view.

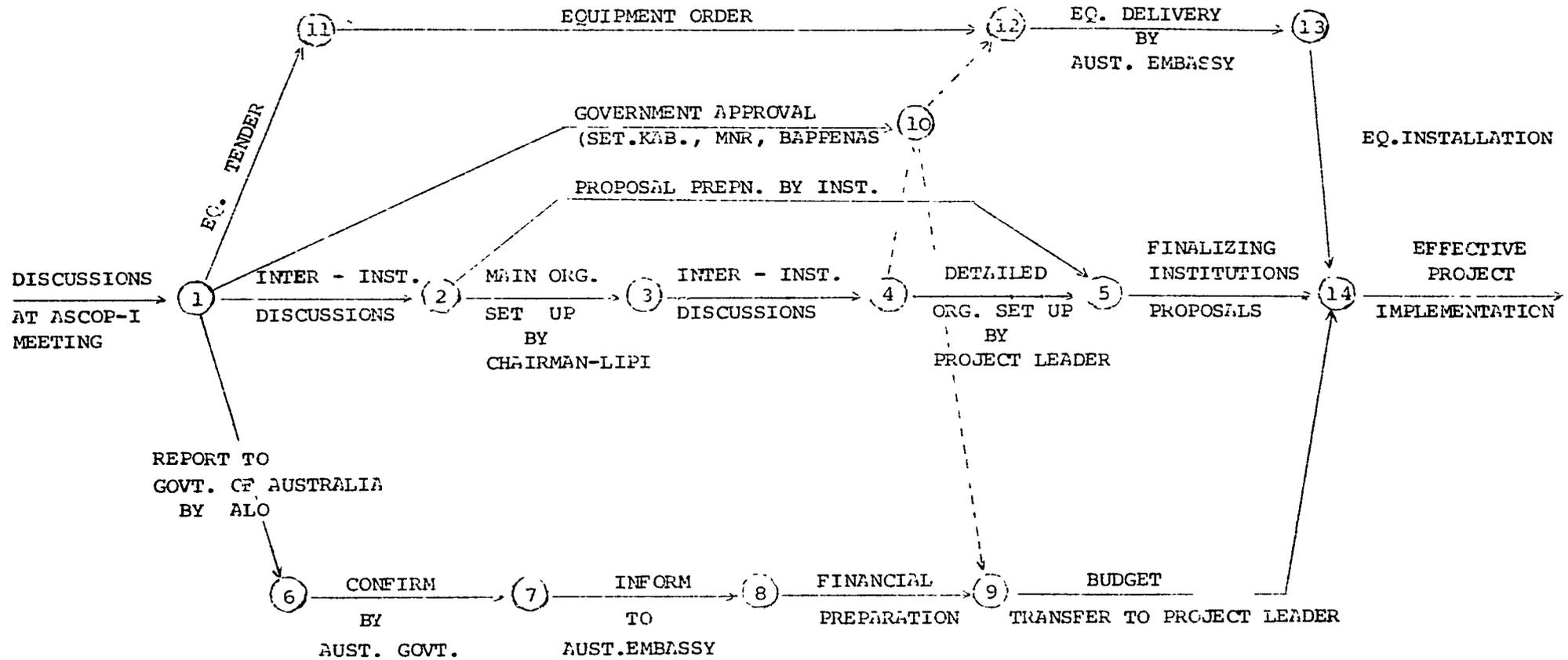
Appendix 2

Distribution of personnel among the participating institutes (1976)

	Institutes	LKN-LIPI (Bandung)	BIOTEK/ ITB (Bandung)	FATEMETA IPB (Bogor)	LBN-LIPI (Bogor)	GIZI Sem. (Bogor)	GIZI Dep. (Jakarta)	F.T. UGM (Yogya)	F.P. UGM (Yogya)	LIPI (Jakarta)	Total
1.	Project Leader/Head of Project Committee	(1)	-	-	-	-	-	-	-	-	1
2.	Secretary/Members of Project Committee	(1)	(1)	-	-	-	-	(1)	-	(1)	4
3.	Head of Project Secretariat	(1)	-	-	-	-	-	-	-	-	1
4.	Treasurer	(1)	-	-	-	-	-	-	-	-	1
5.	Sub-Project Leader :										
	I.1	-	-	(1)	-	-	-	-	-	-	)
	I.2.a	-	(1)	-	-	-	-	-	-	-	)
	I.2.b	-	-	-	-	-	-	(1)	-	-	) 6
	I.3	(1)	-	-	-	-	-	-	-	-	)
	III.a	(1)	-	-	-	-	-	-	-	-	)
	III.b	-	-	-	(1)	-	-	-	-	-	)
6.	Institute's Representatives	(5)	(2)	(2)	(1)	(2)	(1)	(1)	(2)	-	16
7.	Research Staff (not including staff holding the above functions)	(4)	(2)	(9)	(1)	(3)	(1)	(4)	(2)	-	26
<b>Total number of personnel</b>		<b>15</b>	<b>6</b>	<b>12</b>	<b>3</b>	<b>5</b>	<b>2</b>	<b>7</b>	<b>4</b>	<b>1</b>	<b>55</b>

Appendix 3

PERT CHART OF THE ACTIVITIES  
OF THE ASEAN PROJECT IMPLEMENTATION  
IN INDONESIA.



Dates of events :

- |  |                   |   |                   |
|--|-------------------|---|-------------------|
| ① Closing of 1 <sup>st</sup> Ascop meeting (30 Nov.1974) | ④ .....           | ⑧ .....                                   | ⑫ .....           |
| ② .....  | ⑤ 1 December 1975 | ⑨ .....                                   | ⑬ .....           |
| ③ 9 June 1975  | ⑥ .....           | ⑩ .....                                   | ⑭ January 1, 1976 |
|  | ⑦ .....           | ⑪ Closing date for tender (12 Aug - 1975) | ⑮ .....           |

EFFORTS TO COORDINATE INFORMATION AROUND THE WORLD

Examples :

- UNISIST, Paris, France. A continuing, flexible programme based on a joint UNESCO-ICSU study with the aims of co-ordinating existing trends toward cooperation, of acting as a catalyst for the necessary developments in scientific and technical information, of developing the necessary conditions for micro-systems interconnection and of facilitating the access to world information sources. The ultimate goal: . . . . . establishment of a flexible and loosely connected network of information services based on voluntary cooperation.
  
- UNIDO : Industrial Information Bank - see "Survey of Some Feasibility Issues". Theodore Schlie 21 June 1976.

OFFICE OF INTERNATIONAL PROGRAMS

DENVER RESEARCH INSTITUTE

UNIVERSITY OF DENVER

Know-How Information Services

The Office of International Programs of Denver Research Institute (DRI) is carrying out a program on "Coupling with Industry" sponsored by the Office of Science and Technology of the U.S. Agency for International Development. The objectives of this program is to assist and stimulate industrial research institutes in the less-developed countries (LDCs) in becoming more useful and relevant to their intended clients -- i.e., local industry, particularly small-scale industry -- and thus to their country.

One component of this Coupling with Industry program is vaguely titled, "Technical Information Services." Rather than attempt to compete with or improve on the many existing scientific and technical information systems, DRI has decided that the limited amount of money allocated to this effort might most productively be spent by experimenting on innovative approaches to technical information, and also by using this technical information to build on its other activities in LDCs. The information concept that is being developed and tested has been termed Know-How Information Services (KIS). One of the KIS activities is described below.

One of the continuing complaints which developing countries have with respect to the import of technology-- machinery/equipment, components, systems, entire plants-- is a lack of information of alternative foreign suppliers. Often, only one or two suppliers are known, suppliers with whom the developing country customer has dealt with in the past, many times based on historical colonial ties. This lack of information puts the customer at a disadvantage in that he is unable to "shop around", evaluate alternative technologies, and negotiate to derive the best possible bargain.

In attempting to deal with his issue, DRI has developed a working relationship with Information Handling Services (IHS), a private for-profit firm based in Denver. IHS's product is the edited and organized information from thousands of industrial suppliers' catalogues and standards and specifications organizations' documents, which is frequently (every fifteen days in some cases) updated. The heart of the service is the indexing system, which has been developed over many years and which is applied by experienced engineers to the mass of information which is the input to the system. Through the use of this system, the design engineer, manager, or purchasing agent can, within minutes, determine all the producers of any particular product in the system and obtain the actual catalogue pages describing them.

In working with DRI, IHS has supplied, on an experimental basis, this type of information on the equipment and equipment components that the Pakistan Council of Scientific & Industrial Research (PCSIR) needs to import to start up a Fish Protein Concentrate pilot plant. The use and evaluation of this information is still in process, so that no results are yet available. This is one form of technical information services, however, that PCSIR might usefully provide to its small-scale industrial clients.

Another common complaint in many developing countries is that they, themselves, do not have any idea of the extent and variety of industrial products that are being produced, or are able to be produced, locally. Catalogues and other product information mechanisms are relatively scarce. In a perhaps extreme case, the result of this lack of information is the import of an industrial product, with consequent foreign exchange and balance of trade implications, when it is unknowingly being made locally. Furthermore, if developing countries are ever going to break their existing trade patterns with developed countries, they must begin trading industrial products amongst themselves. This process also requires that information on industrial products be collected and packaged. The actual collection and packaging of this information must be done by the developing countries themselves. DRI sees a potential role for itself together with IHS in supplying technical and advisory assistance in this task.

EXAMPLES OF DIRECTORIES

(For coverage of general information sources and systems . . .  
"know what is available.")

- Kruzas, Anthony T., ed. Encyclopedia of Information Systems and Services, 1st ed. Ann Arbor, Mich., Edwards Bros. (1971) 1190 p. AG521. K78

- Herner, Saul, and Matthew J. Vellucci, eds. Selected Federal Computer-Based Information Systems. Washington, Information Resources Press, 1972. 215 p. Z699. H47

"Enlarged and updated version of Selected Mechanized Scientific and Technical Information Systems . . . published in 1968 (by Herner and Company, Washington, D.C.)"

- Herner, Saul. A brief guide to sources of scientific and technical information. Washington, Information Resources Press, 1969 (c1970) 102 p.

"A recapitulation and refinement of the substantive content of a one-and-a-half day course . . . developed under the sponsorship of the Panel on Education and Training of the committee on Scientific and Technical Information". Companion volume to Exhibits of Courses on Scientific and Technical Information written by S. Herner and J. Moody.

- World Guide to technical Information and Documentation Services.
- Guide Mondial Des Centres De Documentation et D'information Techniques. UNESCO 1975 (1980).

Information Industry Association Directory 4720 Montgomery Lane  
Suite 904 Bethesda, Maryland 20014.

Selective Directories with additional information

- LIST: Library and Information Science Today.  
1971 + (New York) Science Association/International. Z669.7.L18
  
- Cornell University; Science + Technology for International  
Development: A Selected List of Information Sciences in the US  
and Bibliography of Selected Materials, February 1975; Program  
on Policies For Science and Technology in Developing Nations.  
180 Dris Hall, Cornell, Ithaca, N.Y. US 14853.

Regional Example :

- Kraus, David H., Pranas Zunde, and Vladimir Slamecka. National  
Science Information Systems; a Guide to Science Information Systems  
in Bulgaria, Czechoslovakia, Hungary, Poland, Romania, and  
Yugoslavia. (Cambridge, Mass., MIT Press, 1972) 325 p.  
Includes bibliographies. AG540.K7

Attachment VIII

EXAMPLES OF INFORMATION SYSTEMS

A systems that are free . . . . . minimal charge useful services . . .  
subject to limitations of time + lack of personal attention/investigation

- United Nations Industrial Development Organization
  
- Volunteers in Technical Assistance; VITA 3706 Rhode Island  
Avenue, Mt. Rainier, Maryland.  
(Industrial Profiles, "How to" Reports, ICA, Bibliographies + other  
documents in possession)

Systems that might be of Particular Interest to Developing Countries.

- Technotec/Worlotech; PO Box 0, Minneapolis, Minn., US 55440
  
- Technonet; Singapore
  
- Information Handling Services; PO Box 1154, Englewood, Colorado,  
US 80119

Attachment IX

Examples of Information Systems in Specific Subject Area

AMERICAN SOCIETY FOR METALS. Metal Park, Ohio 44073

PIRA (The Research Association for the Paper and Board, Printing  
and Packaging Industries)

Randalls Road

Leatherhead Surrey

England

Hyslop, Marjorie R. A brief guide to sources of metals information.  
Washington, Information Resources Press, 1973. 180 p.

TN675.4.H95

Food and Agriculture Organization of the United Nations.  
FISHERY RESOURCES AND EXPLOITATION DIVISION. INLAND FISHERY  
BRANCH. FISH CULTURE SECTION. Directory of fish culture  
research institutions. Rome, Food and Agriculture Organization  
of the United Nations, 1969. lv. (unpaged)

SH1. F1 no. 85SH20.5

Organizations Interested in/or Offering Assistance an  
"Extension" to Industry

- Georgia Institute of Technology, Atlanta, Georgia 30332
- Illinois Institute of Technology Research  
10 West 35th Street, Chicago Illinois, 60616
- International Development Research Center  
Box 8500, Ottawa, Canada.
- Denver Research Institute - OIP  
2050 E. Iliff  
Denver Colo 80208
- Infotec - Conacyt  
San Lorenzo 153 - 11 Piso  
Mexico 12, D.F.

Training : Information Centers

I. Selected Bibliography

1. "Guidelines on The Conduct of National Inventory of Scientific + Technological Information + Documentation Facilities" SC/75/WS/28 Paris April 1975, UNESCO.
2. "The Necessity for a National Information Policy" Lamberton, 1974, Australian Library Journal, vol 23, # 6, July p.211-16.
3. "Guidelines For Evaluating Training Courses" - UNISIST SC/76/Ws/79 Division of Scientific + Technological Documentation + Information, UNESCO, Place de Fontenoy, 75700, Paris.
4. Symposium on International Cooperation in Terminology, UNESCO, Vienna 9-11 April 1975.
5. "Guidelines on the Planning of National Scientific + Technological Information Systems," UNISIST; SC/75/WS/39 July 1975.
6. Planning National Infrastructures for Documentation Libraries - Archives, J.H. d'Olier + B. Delmas.
7. "Reference Manual For Machine Readable Bibliographic Descriptions" UNISIST, SC74/WS/20.
8. "The Marketing of Information Analysis Center Products and services," June 1971, Ergic/CLIS, American Society for Information Science.

II. Information Services + Systems to Serve as Examples for the use of information that may be valuable to organize

Congressional Information Services

The Information Bank

Disclosure Inc.

Technology Clearing House

Xerox Datrix II

Economic Information Systems

Descriptions of these services and systems follow.

CIS                    Congressional Information Services, Inc.

7101 Wisconsin Avenue

Washington, D.C. 20014

Officers: Publishers - James B. Adler

Congressional Information Services is a private publisher of master indexes to -- and microfiche copies of -- U.S. Governmental documents.

In 1970, CIS introduced the CIS/INDEX, the first abstracting and indexing service to provide a comprehensive awareness of the current information output of Congress.

Since then, CIS has expanded its coverage from Capital Hill to the entire Federal Government; from current publications to those dating as far back as 1789; and from hard copy indexing to data bases on-line.

Two of the most significant fields of current Government publishing actively are fully covered by CIS:

- Congressional documents-including all of the working papers of Congress
- Federal statistical publications-including all of the statistical data issued by all the branches and agencies of the U.S. Government

In each of these distinct fields of coverage, CIS provides comprehensive reference service which:

- Identify all relevant publications
- Catalog each publication in full bibliographic detail
- Describe the contents of each publication fully
- Announce new publications
- Index all of these publications in full subject detail

## The Information Bank

Mt. Pleasant Office Park

1719A Route 10

Parsippany, New Jersey 07054

Telephone 201-539-5850

Officers: President - Carl O. Keil

The Information Bank is a time-shared information storage and retrieval system. Updated daily, it contains a data base of abstracts of news stories, essays, surveys and other material published in the Late City Edition of the New York Times newspaper and 60 other newspapers and periodicals, including the Wall Street Journal, Business Week, Washington Post and Los Angeles Times. The data base is from 1969 to current and contains over 1,200,000 entries. This system is designed to respond to the current information requirements of major corporations and business executives, public and academic libraries and librarians and government agencies and officials.

### Disclosure Inc.

4827 Rugby Avenue

Bethesda, Maryland 20014

Disclosure is America's largest bank of business information. Since 1969, they have been the largest supplier of reports filed with the SEC by America's publicly-owned companies.

They offer access to the 90,000 SEC reports filed every year. Their total data bank contains more than half a million documents.

By quickly providing information on other people's decisions, they help investors, advisers, lawyers, accountants, bankers, and business executives make better decisions of their own.

Technology Clearing House, Inc.  
 1105 Market Street  
 Wilmington D.E. 19801

Telephone : 302-658-7831

Technology Clearing House comprehensively compiles and abstracts new technical products and services - - internationally and from all fields of science. It is designed as a clearing house; putting together those with technical needs and those with the new technology to fulfill the needs.

Xerox

Datrix II

300 North Zeeb Road  
 Ann Arbor, Michigan 48106

Xerox's Datrix II is a computerized information retrieval system. It directs a computer search which identifies doctoral dissertations in your particular area of study. As a result of this search, one receives a computer printout of up to 150 dissertation citations. The combination of its vast dissertation data base with computerized search capabilities.

EIS Economic Information Systems

9 East 41st Street  
 New York, New York 10017

Telephone : (212) 697-6080

Officers :

President : Jay M. Gould

EIS maintain two data bases designed to answer the questions: Who buys what. How much and where, and who owns whom? One data base covers business establishments with 20 or more employees, the other is an input/output data base tracing the inter-industry purchases of over 700 products and services.

**Principle Products****Market Potential Reports-**

A computer printout pinpointing the market for a product or service. It lists potential purchasers by state, county, area, industry, by company, or ranked by volume of purchases.

**Marketing Information System-**

Consists of punch cards and tapes with the information and EDP programs necessary to generate Market Potential Reports and other information products.

**III. Examples of Training Programs ; Information + Technology Transfer**

1. National Technical Information Service-Workshops, Washington D.C.
2. DRI-IDRC-Georgia Tech "Extension Agent" Training for Developing Countries
3. Course in Information Retrieval at The Brazilian Institute for Bibliography + Documentation (IBBD) Dec 16 1973-Dec 13 1974-UNESCO
4. Training in Automation of Library Processing; Oct 26 - Dec 8 1977, Sept 6 - Oct 26 1973; UNESCO (3046/RMO/RD/DBA)
5. Herner + Company, 2100 M St. NW, Washington D.C. 20037 - U.S. consulting service in the design, evaluation and operation of library and information programs, conduct of information use and readership surveys, custom literature searches, abstracting and indexing, publishing and marketing of abstracting and indexing, publications, information source directories, and other reference work.



V. Know How Information . . . . .Combination of Above . . . . .Brokers

Linked/Twining/Sister Institutions  
ex: DRI

Government Assistance Programs  
ex: AID Mission

VI. Descriptions of some of the examples mentioned in this Attachment

SDC - System Development Corporation

2500 Colorado Avenue  
Santa Monica, California 90406  
Telephone : 213-829-7511

System Development Corporation has been ~~designing~~and developing computer-based information systems since it was founded in 1956. They began operating the first "U.S. -wide-on-line-bibliographic retrieval service" in 1965 and have continued to develop and **expand** their retrieval system, data bases, computers, telecommunications support, and customer services, to set the highest performance standards in the retrieval service industry.

Since 1974 SDC Search Service has become an international service, providing access to a world of information from anywhere in the world. In 1975, SDC received the Information Product of the Year Award from the Information Industry Association in recognition of SDC Search Service "for its usefulness, innovation and responsiveness to the information needs of a changing society".

Lockheed Information Systems

Code 5208/201  
3251 Hanover Street  
Palo Alto, California 94304  
Telephone : 800-227-1969  
415-493-4411

Subsidiary of Lockheed Missiles and  
Space Co., Inc.

Officers :

Manager - Roger K. Summit  
Customer Services - Thomas M. Crawford  
Eastern Marketing - Robert Donati  
Western Marketing - Frances Spigai

Principle Product

Dialog<sup>R</sup> Information Retrieval Service provides continuous access to the world's largest collection of online databases. Coverage includes the fields of Science, Technology/Engineering, Social Sciences, and Business/Economics. Users benefiting from Dialog include libraries, information scientists, researchers, managers, and educators.

NTIS - National Technical Information Service

U.S. Department of Commerce  
Springfield, Virginia 22151  
Telephone : 703-321-8000

Officers :

Secretary - Peter G. Peterson  
Undersecretary - James T. Lynn  
Acting Assistant Secretary - Richard O. Simpson  
for Science and Technology  
Director, NTIS - William T. Knox

The Commerce Department's National Technical Information Service\* is the central source for the public sale of Government-sponsored research and development reports and other Government analyses prepared by Federal agencies, their contractors or grantees.

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\* Formerly the clearinghouse for Federal Scientific and Technological Information.

The agency is required by statute to price its products and services for cost recovery and is largely self-sustaining, realizing less than 20 percent of its financing from direct appropriations.

Through NTIS, the Department of Commerce is one of the world's largest processors of useful information. In 1971, NTIS supplied the public with more than two-and-a-half million documents and microfiche. The NTIS information collection exceeds 680,000 titles with 100,000 in current stock. All are available for sale. NTIS answers more than 180,000 requests for information each year and fills about 8000 orders a day.

Many related services are available:

- Research and develop new markets
- Solve technical problems
- Assess the scope of Federal research
- Produce new products
- Write Government contract bids
- Develop a basis for planning
- Reduce costs
- Keep up to date

EPA            Environmental Protection Agency  
                 International Environmental  
                 Documents Exchange  
  
                 Office of International Activities  
                 Waterside Mall  
                 401 M Street, S.W.  
                 Washington, D.C. 20460  
  
                 Telephone: (202) 755-0560

Under the International Documents Exchange, initiated in 1972, the U.S. Environmental Protection Agency trades environmental reports

with its counterpart agencies throughout the world. Exchange of documents among organizations responsible for environmental programs is a significant step toward pooling information resources on the international level.

BI Business International Corporation

One Dag Hammarskjold Plaza

New York, New York 10017

Telephone: 212-759-7700

Officers

Founder and Chairman - Eldridge Haynes

President - Orville L. Freeman

Senior Vice President - William Persen

Senior Vice President - Richard P. Conlon

Vice President - Jose A. Mestre

Vice President and Chief Operating Officer - Norman M.

Wellen

Vice President - Robert S. Wright

Business International (BI), an independent research, publishing and advisory organization, serves corporations doing business across borders and those who support and govern them, including bankers, attorneys, accountants, consultants, colleges and universities and government officials.

BI's goal is to advance profitable corporate and economic growth in socially desirable ways. It does by:

- Providing fast, reliable information needed for corporate decision making, planning and management development.
- Alerting corporate management at home and abroad to new opportunities and dangers.
- Discovering, explaining and interpreting new international management techniques that will advance profitable corporate and economic growth.

- Analyzing governmental measures that will make sound economic growth and greater international cooperation and that will pave the way for corporations to make their maximum contribution to human welfare and to advance their own survival and prosperity.

BI advances these goals through its staff of researchers, analytics, editors and executives located in the key markets of the world. It renders these services through:

- A comprehensive information system
- Research - individual studies for clients
- Advisory services
- Roundtables (for special clients)
- The BI Institute

This highly organized, worldwide system furnishes current and reference information in the form of weekly published services, constantly updated reference services, in-depth analyses of markets and management functions in the form of research reports and management monographs, plus regularly updated economic, financial and market data -- and forecasts -- for many countries available either in printed form or instantly via an international computer network.

BIOSIS            Biosciences Information Service  
                  2100 Arch Street  
                  Philadelphia, Pennsylvania 19103  
  
                  Telephone: 215-568-4016  
  
                  Officers  
                  Dr. H. Edward Kennedy

BIOSIS was created in 1926 and has served the information needs of the World Community of bioscientists. BIOSIS is the world's largest English language abstracting and indexing service for biological and biomedical research.

BIOSIS is an independent, nonprofit organization. It maintains liaison with many biological societies, including three of its founders: the American Association for the Advancement of Science, the National Academy of Sciences and the American Institute of Biological Sciences.

BIOSIS provides biological research information in the forms most useful to individual scientists, educational and research institutions, government agencies, and industrial corporations. The present annual coverage totals 240,000 items originally published in more than 8,000 serials as well as in books, monographs, conference proceedings, research communications, etc.

Commission on Engineering  
Information Engineers Joint Council  
345 East 47 Street  
New York, New York 10017  
Telephone: 212-644-7842

This is <sup>a</sup> guide which provides sources of abstracting and indexing services; do bibliographic literature searches, etc.; provide referral services.

EIC           Environment Information Center  
  
124 East 39th Street  
New York, New York 10016  
  
Telephone: (212) 685-0845

Officers:

President and Publisher: James G. Kollegger

Director of Information Services: Alain R. Carr

EIC is an independent clearinghouse for energy and environmental information serving 2,000 clients in 50 nations. The EIC system monitors the key international trade and professional organizations,

governments, and corporations and provide quick access to their information resources. Services include computer tapes, on-line networks, document retrieval, and contract research.

#### Principal Products

Energy Information Abstracts specializing in socio-economic impact, new energy sources and planning; covers the non-serial reports of 2000 organizations plus several thousand core journals; published bi-monthly; includes annual index.

Environment Abstracts covers 21 pollution and resource areas, monitoring the documents of the world's leading environmental organizations and 3400 journals; published monthly; approximately 1,200 pages.

The Energy Index covers trends, statistics, legislation, new books, films, and 2,000 of the year's top reports and articles; 600 pages.

Energy Directory Update covers five major types of energy organizations: federal government, state and regional government, trade and professional organizations, energy industry, and energy information systems.

#### UNEP/IRS - United Nations Environment Program International Referral System

U.S. Environmental Protection Agency  
Washington, D.C. 20460

The United Nations Environment Program (UNEP) established an International Referral System (IRS) to facilitate the international transfer of environmental information. The UNEP/IRS, using its world-wide computerized directory based on national inventories of environmental information services, will link those needing information to solve environmental problems with prospective sources of assistance.

The functions of IRS are:

- (1) To provide an international organizational framework for sharing environmental information resources.
- (2) To promote the development and strengthening of national information systems which can participate in the IRS on a partnership basis.

INFORMATION SERVICES FOR R & D IN INDONESIA

by

Zultanawar

I. Background

The National Scientific Documentation Centre is a library based information centre catering to all those who need information in the field of science and technology. Besides giving ordinary library services (e.g. reading room service, loan service and reference service) it also gives a current awareness service, a retrospective literature search service, a document supply service, an inquiry service, a referral service, a translation service, etc.

The collection of PDIN is about 50,000 books; mostly reference books, bibliographies, and annual reviews. It subscribes to over 700 current periodicals including several important indexing and abstracting journals. It has a special collection on standards (BSI, U.S. Federal standards, ASTM), Indonesian materials (serials and monographs from 1945 to the present), dissertations, AID research reports, etc.

Although the collection of PDIN is not so large, it is however, enriched by its special relationship with other libraries within a network system and by its easy access to the collection or data bases of foreign information centres.

PDIN is designated as the coordinator of the four existing library and information network systems, each with its own specialization and its own centre. These are :

1. Library and information network in the field of science and technology with PDIN as its centre
2. Library and information network in the field of biology and agriculture with the Bibliotheca Bogoriensis as its centre
3. Library and information network in the field of health and medicine with the Central Health Library as its centre

#### 4. Library and information network in the field of social sciences with IDIS as its centre.

The program of the network systems are resource allocation, resource sharing, union catalogs, information exchange, document exchange, etc.

Through the network systems it is possible for R & D scientists, anywhere in Indonesia, to request and obtain any published information they need in a relatively short time and at a relatively low price. The term information here is synonymous with literature and does not in any way mean oral information or unprocessed data.

PDIN has a special relationship with CSIRO (Australia), Tropical Products Institute (U.K.), National Library of Medicine (U.S.A.), British Lending Library (U.K.), UNIDO (Vienna), and the national libraries and national documentation centres of ASEAN countries.

## II. The Information needs of scientists

We can easily predict the needs of scientists or engineers in developed countries such as the United States of America and the United Kingdom since there are many published reports relating to their needs, demands, habits and their preferences.

But we in Indonesia do not know for sure the needs of our research scientists, especially to determine whether the existing library or information centres are capable of coping with their information needs or whether a new kind of information service is needed.

In 1974 PDIN carried out a survey on the information needs of scientists, engineers, and managers in Indonesia. A short report of the results has been published in Laporan Hasil Survey Nasional Informasi Ilmiah (Bidang Penggunaan Informasi) (Jakarta, LIPI, 1976).

Here are some of the results of the survey :

1. The scientists, engineers, and managers used and needed scientific and technical information at least once a week.
2. One third of the respondents needed information badly and immediately. Another one third of the respondents thought that it was difficult to get information from libraries. Another one third of the respondents could wait for a period of a week.
3. More than half of the respondents thought that it was difficult to get information from libraries.
4. Their methods of keeping up-to-date or keeping abreast of development were :
  - = circulation of new periodicals
  - = attending seminars, congresses, workshops, etc.
  - = circulation of indexes or abstracts of recently published literature, in that order.

From our point of view the information needs of a research scientist can be summed up as follows :

- = The need to have the background information on his future project
- = The need to know what is going on or who is doing what in his own field
- = The need to keep up-to-date with current developments
- = The need to know simple facts or processes, methods, techniques, etc. to carry out the current project
- = etc.

### III. The services of PDIN

The following are the services of PDIN which we think can help to cope with the information needs of a R & D scientist as mentioned above.

#### 1. Current awareness service

The objective of a current awareness service is to brief scientists on newly published literature so that they can follow the developments in their own fields.

PDIN has been giving such a service since 1968 as Informasi Kilat. Informasi Kilat is the circulation of the photocopied content page of a newly received periodical, on request. The selection of periodicals can be made from the list of periodicals received by LIPI institutes (Majalah ilmiah luar negeri yang diterima (langganan, hadiah, pertukaran) LIPI dalam tahun 1976; up-dated yearly).

We are also running, on an experimental basis a current awareness service based on Current contents, which we receive regularly by airmail.

LIPI has also been running a Selective Dissemination of Information (SDI) Service since 1974. The service is provided by the Perpustakaan Sentral LIPI in Bandung.

The services described above are confined to periodical articles only and do not include other kinds of literature (reports, conference papers, patents, etc.) or information on on-going research.

The back-up system of Informasi Kilat is provided by PDIN and the other LIPI institute libraries. The time needed to deliver the original article ranges from between one to 7 days. The back-up system of the Current Contents based current awareness service is provided by PDIN and the British Lending Library.

## 2. Retrospective literature search service

This is the service heavily used by students when they are writing their thesis. They need background information on their future projects. They only receive a list of references pertaining to the problems they are working on. In this case the formulation of the question or the problem is very important. The back-up system is also provided by PDIN with the help of other libraries.

The search itself is done by a staff of subject specialists at PDIN. If the search is difficult or if we do not have the necessary secondary literature to answer the question,

we refer it to the Tropical Products Institute, UNIDO, or any other of the several data basis abroad (MEDLARS, CSIRO, FAO, etc.)

3. Document supply service

This service is not confined to any particular literature as long as it is not a book. We can easily handle periodical articles, international conference papers, US and UK research reports, some standards, US and UK patents, etc.

The time needed to deliver the document ranges from 1 day to 3 months, depending on whether the document is available locally, in Indonesia or abroad.

Information we can not easily supply are : research and survey reports from Indonesia, some standards, statistics, if not published, price lists, trade catalogs, etc.

4. Inquiry services

This service is also provided by a staff of subject specialists. They can answer questions on **sample facts**, processes, methods, techniques, etc. as long as they are published. They are not able to analyse or repackage the information contained in the published information. In this case, PDIN can also refer the questions to appropriate institutions in Indonesia or abroad, such as the Tropical Products Institute or Koninklijk Instituut voor de Tropen.

5. Referral services

Many of the questions asked can not be answered by PDIN and many of the documents requested are not held by PDIN. But PDIN maintains a list of information sources and has a good relationship with other libraries in the network system. We do refer the questions to an appropriate information source (an institution, a library, or an expert). This service is to supplement the other services mentioned above.

#### 6. Translation service

PDIN does not have its own 'resident' translator but can call upon a panel of outside translators.

Most of the translations done through PDIN are English into Indonesian, Indonesian into English, and French into Indonesian.

The services mentioned above are the services rendered by PDIN specially for R & D scientists. Besides such services PDIN also renders traditional library services, reproduction services, documentation services, etc.

#### APPENDIX : 1. Case I

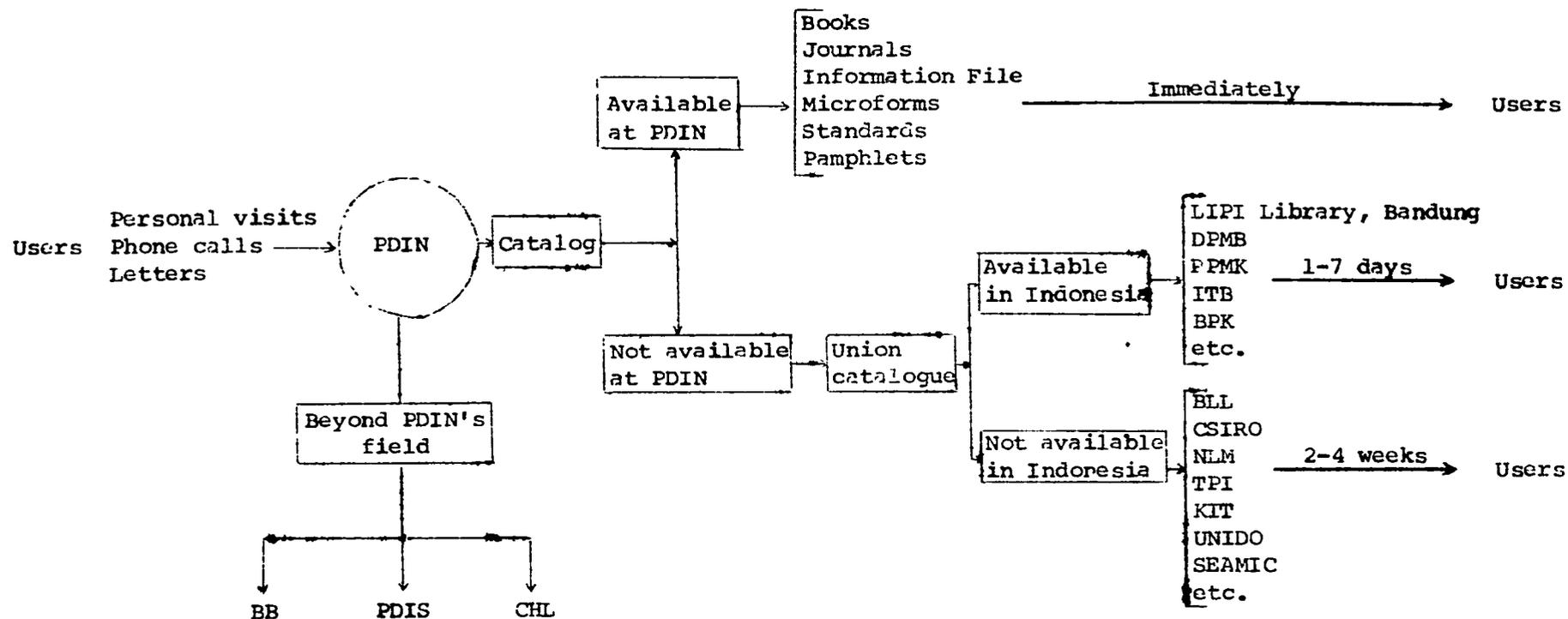
2. Case II

3. Information services of the library and information network.

1. CASE I : 1. A request for information from a medical doctor who was going to do research into the determination of the sex of the unborn child by way of its fetal heart beat.
2. The search was begun by looking up in references in the Index medicus held by PDIN. The result of the search was nil. PDIN then requested the W.H.O. Geneva to search the data bases of MEDLARS. The result was one reference in French.
3. The search took 2 months to carry out. The doctor did not say whether he was satisfied or not.
2. CASE II : 1. A research chemist who was doing a project on cashew nut shell liquid, wished to know all previous articles on the subject.

2. Since PDIN did not have the necessary tools for it, a request was made to the Tropical Products Institute to do a search on its technical index. The result of the search was 8 references, mostly in English. The list of references was sent to the research chemist. He wished to receive 7 original documents from the 8 references. Three were held by local libraries and the other four by foreign libraries.
3. The search took about 3 months, beginning with the receipt of the research chemist's letter and ending with the despatch of all the documents to him.

### 3. Information services of the library and information network



#### Notes

- BB = Bibliotheca Bogoriensis
- PDIS = Pusat Dokumentasi Ilmu-Ilmu Sosial (Documentation Centre for Social Sciences)
- CHL = Central Health Library
- DPMB = Direktorat Penyelidikan Masalah Bangunan (Directorate of Building Research Institute)
- ITB = Institut Teknologi Bandung (Institute of Technology Bandung)
- BPK = Balai Penelitian Kimia (Chemical Research Institute)
- PPMK = Pusat Penyelidikan Masalah Kelistrikan (Electric Power Research Centre)

SUMMARY OF RESPONSES TO FIRST DAY QUESTIONNAIRE\*

1. This question centered upon external influences on research projects. Most people (17) felt that, of the choices given, National Development Plans was the most important external influence. Twelve people (12) marked Development Budget for their Institutes as important. Industry Needs was cited by 9 people and 5 mentioned Goals of the Institute.
2. The first of the three questions under this heading was answered by the general discussion and is not summarized here. In answer to the question, Where did the Project Idea Originate?, the responses fell into three categories. Eight (8) people felt that ideas came from outside the Institute either from Ministries, Industry or Government Directorates. The Institute or Institute Director was cited as the source of ideas by 11 people. Twelve (12) people felt that ideas came from the project leader or research worker.

Everyone felt that the responsibility for the project planning rested inside the Institute. Opinions were equally divided with 16 people suggesting that the Institute or Institute Director has this responsibility whereas 15 people thought that the Project Manager was responsible.

3. The wording of question 3 may have been somewhat ambiguous and the responses were difficult to segregate. The following summary contains a fair amount of subjective feelings on the part of the evaluators. There were 4 people who unequivocally stated that they had a formal control and reporting system. Eleven (11) people stated that no formal system was in effect at their institution. The remaining 14 responses were judged to convey a "sort of" control and reporting system. The emphasis was most often placed on periodic reporting without indication that these reports were used in control. Control in the sense that the function was defined in later workshop

\* See Attachment to this summary

sessions. Others stressed budget reporting again with a seemingly narrow definition of control.

4. This question was directed to the characteristics of the report audience in Indonesia. As in question 3, subjective interpretation was required. Technical supervisors were cited by 16 people as the recipients of reports. Twelve (12) participants stated that their reports were read by policy makers or administrators and 4 responded that their reports were read by users.

The purpose of reports was felt by a majority, 15 participants, to be project evaluation in one form or another. Eight (8) responded that justification of the budget was a major purpose of reporting and 6 people cited conveying results to users as the *raison d'être*.

5. In response to the question about commercial or governmental utilization of research results, 23 participants felt that results had been used. Of these 17 indicated governmental use, 4 specified industrial use and 2 did not indicate the usage. Three (3) responses suggested that utilization might occur in the near term and 4 people felt that no utilization had occurred.

The second part of this question dealt with barriers to utilization of research results. The participants who answered this query overwhelmingly (25 persons) felt that there were limitations. Only 2 responses suggested that there were no barriers. Multiple reasons were provided by a number of respondents. Systemic difficulties in government, industry or the institutes were cited 10 times. Communication problems and budget limitations were each mentioned by 9 participants while manpower limitations were mentioned by 4. Various other problems were brought forward by 4 participants.

6. This question focused on the criteria used in evaluating Indonesian projects and the level at which projects are evaluated. Nine (9) responses cited budget performance and 8 cited project goals as the important criteria. Several different replies were combined

by the evaluators into a category that might be called project progress/quality. This category had 5 contributors. Four (4) participants mentioned national needs or goals and institute goals was mentioned once.

The person or office responsible for evaluation was viewed in several different ways. Eleven (11) persons felt that this function was at a higher administrative level outside the institute. The research manager was named by 6 participants while 4 cited the institute director. An administrative group within the institute was named 3 times and 2 persons said that they did not know where this responsibility lay.

7. Question 7 asked how projects within an institute interrelate to one another and whether interaction results from formal or informal mechanisms. The replies were not often specific on the question of how projects interrelate but institute planning steps was cited five times. Twenty (20) people indicated the existence of formal mechanisms for interaction while 11 people noted informal mechanisms.

#### QUESTIONS TO IDENTIFY PARTICIPANT INTERESTS

1. What external influence has the greatest impact on your projects?
  - a) The goals of the institute ?
  - b) National development plans ?
  - c) Industry needs ?
  - d) The development budget for your institute ?
  - e) Other ?
2. How do most of the new projects on which you work become approved ?  
Where did the idea for the project originate ?  
Who is responsible for developing the project plan and budget ?
3. Do you presently have a formal project control and reporting system ? Briefly describe it.
4. To whom do your project reports go ?  
Are they technically oriented readers ?

Administrators ?

What do you believe the primary purpose of project reports to be ?

5. Have any of your projects resulted in commercial use or governmental use ?

In your opinion, what has limited the utilization of your research project findings ?

6. What criteria are used in evaluating research projects ?

Who does the evaluation ?

7. How do your projects relate to other projects in the institute ?

What mechanisms exist for interaction between projects ?

Formal ?

Informal ?