

ANDEAN PACT: TECHNOLOGY POLICY

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PREFACE

In July 1971 the IDRC provided a grant of \$146,500 to the Andean Pact for an eighteen month programme of research to be carried out directly in support of efforts to develop the Pact's policies for technology. The period of the grant was subsequently extended to twenty-one months and the financial life for this Phase I project was closed in October 1973. A Phase II grant was approved by the IDRC Board of Governors in March 1973. This was for \$275,050 over three years, and was to be matched by \$390,000 allocated for technology policy work by the Junta of the Andean Pact. The start of Phase II was delayed until January 1974, and the finishing date was expected to be December 1976.

In June 1976, Dr. Constantine Vaitsos, Director of the Technology Policy Group since its inception, left the Junta to take up an IDRC Senior Research Associate Award. Dr. Luis Soto-Krebs was appointed to be his successor. At the time of the IDRC review, in December 1976, Dr. Soto was reformulating the priorities of the Division and subsequently in February 1977 requested the approval of the Centre for a reallocation of funds, and an eighteen month extension of the time period.

On December 13th and 14th 1976, an IDRC review panel* met in Lima with members of the Junta of the Andean Pact, and with staff of the Pact's Technology Policy Programme, to review the work carried out during the Phase II project. The initial arrangements for this review were made with Dr. Vaitsos prior to his departure from the Junta, and the final detailed arrangements were made by Dr. Soto.

Following preliminary discussion in Ottawa in October, the IDRC Review Panel met on its own in Lima on the evening of December 12th to agree on the critical issues for discussion. On the morning of 13th December we met with Sr. Luis Barandiaran from Peru who is Chairman of the Junta,** and with his co-member, Sr. Alberto Fernandez, who is from Venezuela. This was a brief meeting at which we were welcomed, and gave an explanation of the purpose of the evaluation. We met twice more with the Junta - once as their luncheon guests at the National Club, and finally in a private session at the conclusion of the review, when we reported on our impressions. Mr. Rafael Garcia Velasco, from Ecuador, the third member of the Junta, was also present at the luncheon meeting.

* The panel participants were: Dr. Louis Berlinguet, Senior Vice President; Dr. Geoffrey Oldham, Associate Director, Science and Technology Policy Programme, SS and HR Divisions, and Mr. Martin Bell, Senior Programme Advisor, Science and Technology Policy Programme.

** The principal decision making and negotiating body of the Andean Pact is the Commission. This is made up of representatives of each of the national governments acceding to the Acuerdo de Cartagena. In effect its various Decisions constitute international treaties between the member states. The Secretariat of the Pact is based in Lima and is headed by a three man Junta. The term of the Junta is three years and each member serves as chairman for one year of his three year term.

Dr. Soto carried the main burden of presenting the work of the group. He was joined by two members of the team for discussions of their particular areas of work - Dr. Marcelo Tejeda (forestry and forest products technology) and Dr. Alex Triers (food technology). In addition, Constantine Vaitas was present for most of the discussions.

We are extremely grateful to the members of the Junta and to Dr. Soto and his colleagues for the time they made available, for their frankness and helpfulness during discussion, and, not least, for their hospitality.

We are assisted in our review by the IDRC Regional Office in Bogota. They provided us with a very useful review of the origins and history of the Andean Pact, including an assessment of the current crisis and future prospects. We also received helpful comments from the Field Coordinator of the IDRC-supported Science and Technology Policy Instruments Project and his staff in Lima. Their comments and views helped to provide the background against which we were able to view the specific Andean Pact Technology Policy Project. We are grateful for their considerable help.

In writing this report we were faced with the choice of preparing a brief summary report which would have a wide general readership within the IDRC and the Junta of the Andean Pact, or preparing a more extended technical report of prime interest to the science and technology policy groups in both organisations. We have tried to follow a middle path and recognise that we run the risk of satisfying neither sets of readers. However we thought it desirable to prepare a fairly thorough report of our findings and then summarise the main conclusions in the final chapter. In this way those who are only interested in the generalities can confine their reading to the last part of the report, and those who wish to learn more about science and technology policy research in the Andean region can read the full text.

We agreed at the beginning of the review that it was to be a joint undertaking. Both the IDRC and the Andean Pact teams would write their own reports and these would be exchanged. We also agreed that the first draft of the reports would remain confidential to the participants in the review in order to ensure that no information considered confidential would be released. After this first exchange and checking, the reports could be circulated to other members of the two organisations. This paper is the IDRC contribution to this joint review of the Phase II project.

1. INTRODUCTION

A. The Purpose and Method of the Review

(i) Objectives of the Review

The main purpose of the review was to assess the lessons which might be learned from the experience of the programme of work carried out by the Technology Policy Group of the Andean Pact over the past five years with financial support from the IDRC.

The Andean Pact Project was one of the first science and technology policy research projects to be supported by the Centre. In its two phases it has run for more than five years, and the total allocation of Centre funds has been about \$421,550. December 1976 seemed an appropriate time to take stock of the whole project, as well as to review more specifically the work of Phase II.

From IDRC perspective the objectives of the review were:

1. To assess the extent to which the original objectives of the project were met, and the extent to which they were appropriate;
2. To review the methodology that was used and assess its applicability for other projects in other countries;
3. To examine the nature of the IDRC/Andean Pact relationship and where appropriate to draw lessons for future Centre supported projects.

We recognise that the Andean Pact Technology Policy Group will draw its own lessons from the review, but these are not the concern of this report.

(ii) Method of the Review

This review was carried out in a very different way from the review of Phase I. That review had consisted of a meeting held in Lima in the Autumn of 1972 attended by approximately ten eminent persons all well experienced in science and technology policy research. The panel of experts however had no opportunity to critically review the work done in Phase I and no report was issued. We judged this approach to have been disappointing. In part the failure of the group to make a critical review was due to the size and composition of the group, and in part due to the timing of the review. The Andean Pact team had completed their research but had not yet completed their negotiations with the countries of the region over the ensuing policies. They could not, therefore, reveal to the panel the details of these policies, and without them the studies were only of little interest, and their relevance to policy was not apparent.

Drawing on this experience it was decided to carry out the review of Phase II of the project by a small team made up entirely of IDRC staff. We hoped that this would allow more detailed and frank discussions to take place. We believe it did.

(iii) The Limitations of the Review

The IDRC team spent only two days with the Andean Pact Technology Group in Lima. Thus although we were able to explore the links between the Centre supported studies and policy at the regional level we were unable to explore the links between these studies and policy at a national level in the member countries of the Pact. Nor could we make any systematic assessment of the impact of the policies on development.

Although we drew on our previous knowledge of the work of the team, and although we benefitted from the opinions of others, we are only too well aware of the superficial and subjective nature of the review. Despite these limitations we still think there are lessons to be learned from even this restricted method of review and in later sections we will try to make them explicit.

B. Background to the Andean Pact and its Technology Policy Project

In 1968 Colombia, Ecuador, Peru, Bolivia and Chile signed the Acuerdo de Cartagena and thus established the Andean Pact. The main purpose of this agreement was to establish a basis whereby the countries of the Sub-Region could move towards forms of economic cooperation and, in certain areas, towards economic integration. Subsequently, Venezuela joined the Pact, but by the end of 1976 Chile had withdrawn from almost all the constituent parts of the Pact.

From its very earliest days the Secretariat of the Andean Pact recognised that questions about technology were relevant to the advancement of the Pact's economic and political objectives.* More specifically, the acceptance by the member countries of Decision 24** highlighted the need to develop clear policies for technology as a part of the emerging structure of the Pact's policies. The submission of the first proposal to the IDRC in 1971 followed the acceptance of this Decision, and the proposed work was designed in part to elaborate its technological consequences.

Both the request for funds and IDRC's agreement to provide support were predicated on two characteristics of the Andean Pact which put the project in a different category from most other IDRC supported projects. Since these factors condition the way in which the results of the work should be assessed, it is important to state them explicitly:

1. The Junta of the Andean Pact is not an academic institution. Its job is to prepare the drafts of policies and decisions which are then negotiated by the countries. Research is only carried out to the extent that it is needed for policy formulation. Therefore the request for IDRC funds was for a joint study/policy formulation process, with no breakdown between the time to be spent on each of these activities. This is a very important aspect which has implications for the nature of the research carried out and for how one assesses its 'quality'. This issue will be discussed further in the assessment section.
2. The concern of the Andean Pact Secretariat was with science and technology which is socially and economically important. In other words, science and technology are seen as tools to achieve other objectives. These objectives are political as well as social and economic. Furthermore the concern of the technology policy team of the Andean Pact was to develop policies which would result in quick returns on technological investments. It was recognised that unless fairly quick returns on investment could be guaranteed, the politicians would have little interest in investing in technology. It was this emphasis on quick returns which makes the project different from most of the other science and technology policy projects supported by the Centre.

* In this, the Andean Pact was, and to a large extent still is, unique among regional economic groupings in the developing world in seeing that policy about technology must be an integral part of a coherent portfolio of development policy measures.

** Decision 24 of the Commission of the Andean Pact was concerned with the common treatment among the member countries of foreign direct investments, trademarks, patents, licensing agreements and royalties. As with the general concern about technology, this specific decision owed much to the results of earlier diagnostic research carried out mainly outside the formal machinery of the Pact.

Another very important change in the context of the work under review should be noted here. During the lifetime of the Pact there have been fundamental changes in the governments of many of the member countries. These changes have resulted in ideological shifts and general policy changes of the national governments with consequential changes in attitude towards the concept and possibilities of economic cooperation and integration, as well as towards the means by which economic development is to be pursued.

These differences, highlighted by the withdrawal of Chile from the Pact, generated a crisis within the Pact. This has implications both for the work programme of the Technology Policy Group of the Secretariat and for the nature of assessments we can make. We shall return to some of these implications in later sections of the report.

C. An Outline of the Phase I Project.*

This review is primarily concerned with the results of the Phase II project. However in order to see this in its proper perspective it is necessary to have some understanding of what happened in Phase I.

The Phase I project mainly consisted of studies and research which led to the formulation of technology policies needed to "operationalise" Decision 24. These policies were designed to guide the ways in which foreign technology was to be acquired and to encourage the development of local technology. The studies drew heavily on earlier technology policy research which had been carried out in the region. This earlier work was essentially diagnostic but it provided answers to such questions as:- How was technology acquired from foreign sources? What were the costs and other consequences? How well did local technological institutions supply needed technology? What were their limitations and why did these arise?

The Phase I project extended this work and went on to explore some problems at a new level of detail. For example, studies were made of the 'packaging' and disaggregation of supplied technology, and of engineering services.**

* The IDRC support (\$146,500) for this eighteen (later twenty-one) month project was complemented by funds from the Organisation of American States.

** In this respect the project marked a new initiative in technology policy studies. There had been previous examinations of the production of technical knowledge by R & D, and some studies had been made in the region concerning the use of technology in production operations. Almost nothing was known about the critical activities lying in between production and final use - the various engineering and consulting activities which link the two together.

Visits were made to a number of other countries, most of them more developed than the Andean Pact countries, to assess the ways in which the governments of these countries have (a) regulated the flow of foreign technology (b) established procedures for unpackaging technology and (c) helped to build up local technological capabilities. The main purpose of this component was to assist in the formulation of the policies about these issues which should be followed in the Andean Pact region.

The results of this research* were then drawn on to develop the basis for the Andean Pact strategy on technology and development. This strategy as a whole was incorporated into a position paper (later a White Paper), on Technology Policy which was adopted by the member countries. Specific elements of this strategy were elaborated into a number of legislative documents which were presented to, often modified following discussions in, and finally approved by, the Commission of the Pact.** These legislative measures included:

- Decision 84: the basis for subregional technology policy;
- Decision 85: regulations for the application of rules concerning industrial property;
- Decisions 86 and 87: Andean projects on technological development concerning the hydrometallurgy of copper.
- Decision 89: Andean projects on technological development for the use of tropical forest resources.

Several of these Decisions are now being implemented by specific Technology Development Programmes, called PADT's often with financial assistance from other donors. These have included AFN Division of the IDRC which provided approximately \$1 million for the technological research called for in Decision 89 concerned with tropical forest cultivation. German technical assistance has been used to complement Decisions 86 and 87 on the hydrometallurgy of copper.

* Summaries of most of the research undertaken in Phase I have been published by the IDRC in "Technology Policy and Economic Development" IDRC 061e (1976).

** The text of the White Paper on Technology Policy, and of parts of Decisions 24, 84 and 85 have been published by IDRC as IDRC 060e (1976).

A. The Original Proposal

In this section of the report we propose to present a fairly full summary of the work that had been done in Phase II up until the time of our review. This chapter will be of interest primarily to those readers who wish to know the details of the science and technology policy research carried out. Readers whose main interest is in the assessment of project may wish to proceed directly to the next chapter.

Phase II was a logical extension of Phase I. However, it was very different from Phase I, and over time this difference became sharpened. In Phase I the research work was designed primarily to provide the basis for formulating general policies, for drawing up overall guidelines and strategies, and for drafting legislation which set the broad context for technological activities within the region. For Phase II the proposed lines of research work were largely geared to the development of plans for specific, operational projects and programmes.

The distinction between the phases was not clear-cut. The original PADT's which were planned during Phase I have been implemented in parallel with the conduct of Phase II. At the same time, the proposal for Phase II contained elements of work (e.g. items 4 and 5 below) which were similar to the diagnostic, policy-relevant research which had been important in the Phase I activities. However, the balance between these two types of work shifted substantially between the two phases.

The Phase II proposal to IDRC outlined five sub-projects. These were:-

1. The international search for knowledge and the disaggregation of the know-how components required in specific production activities.
2. The analysis and planning for new PADT's.
3. The development of plans for an information system concerned with the acquisition of foreign technology.
4. Studies of small and medium scale industry.
5. Studies on the choice and selection of techniques.

It was originally intended that work would begin in June 1973 but after completion of Phase I the staff of the technology policy group was reduced in size and the people left were engaged primarily in negotiating the agreed contents of the White Paper and Decisions 84 and 85. As a result, work did not begin until January 1974. When the work began, a start was made on all five sub-projects, but it was subsequently recognised that the studies on small and medium sized industry and those on choice and selection of techniques, were not going to produce immediately applicable results. In addition, specific questions about alternative techniques and about small-scale enterprises would often be dealt with as part of the particular PADT and 'Disaggregation' work. The Junta therefore proposed that work on these two sub-projects be stopped and the IDRC funds be

reallocated to strengthen the studies which were felt to have higher priority. This change was approved by the IDRC.

The principal work undertaken in Phase II has therefore been focussed on only three of the original five sub-projects.

B. Work Accomplished by December 1977

(i) Disaggregation Studies

The rationale for work on technological disaggregation stems from the observed fact that most of the technology imported into the region comes in a packaged form.* It was recognised that, whereas the core, or medullar, technology may often be unique and only obtainable from a few sources, the peripheral technologies could be acquired from a multiplicity of sources. Furthermore, there are peripheral technologies which are frequently common to several processes and once acquired by a country could be used for multiple purposes. The Andean Pact Technology Team argued that if the package could be disaggregated into core and peripheral technologies, then it may be possible to obtain a better deal with the technology suppliers by bargaining for the technologies separately. It may even be possible to supply some of the technological elements from local sources and in any event the learning effect of re-packaging would, in most instances, out-weigh the disadvantage of not acquiring the whole package from one supplier.

The team which advanced this disaggregation hypothesis was influenced by the studies they had carried out during Phase I in Japan where the disaggregation approach had been used to good effect by Japanese business and government.

For a 'disaggregated' approach to be taken to the acquisition of industrial technology it is clearly essential that those who make the local decisions and who carry out bargaining for technology-acquisition have appropriate information about the alternatives that are available. The diagnostic research of Phase I had been followed by work to develop a method for effecting disaggregation. This included a number of specific case studies. However, the main objective of the work in Phase II was actually to produce the information about alternatives, and following its analysis: (a) formulate specific sectoral plans for technology acquisition, and (b) meet the needs of individual local decision-makers.

The research and analysis within this sub-project focussed on two sources of technology: foreign sources (hence the concern with developing strategies for international search) and local, intra-regional sources. The balance between these two seems to vary between sectors. For example, in a study concerned with steel-making technology,** the dominant emphasis has so far been on overseas sources. On the other hand, in a study for petrochemicals industry a very heavy emphasis was put on local sources.

* For a more extensive discussion of this issue see Chapter VI ("Breaking up the Technology Package") of Junta del Acuerdo de Cartagena, Technology Policy and Economic Development, IDRC, 1976.

** For a summary of the background to this work see Chapter VIII ("The International Search for Technology: The Iron and Steel Industry") in Technology Policy and Economic Development.

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These sector-oriented studies were initially intended to support the integrated, industrial investment programmes being planned by the Pact - e.g. the planned series of major investments in the petrochemicals sector.* This was, and in principle remains, an important merit of these studies - they were not conducted in a vacuum. However, the changed political and economic policy climates in the member countries has resulted in a slowing down of some of the industrial investment programmes. Substantial funds remain the budget for this sub-project, and Dr. Soto plans to reactivate this area of work during an extension of the project - perhaps elaborating on the work done in the steel sector, and opening up work on pharmaceuticals and coal production.

The output of this type of research and analysis can be illustrated by the case of the Petrochemicals study. The research 'product' in this case consists essentially of three interrelated reports:

- A very detailed breakdown of a range of different types of petrochemical plant, indicating basic specifications of each of the many components, and defining the types of know-how needed.

A register of (primarily local) engineers and consultants with their capabilities for supplying know-how and services related to the plant elements specified in detail.

- A register of the capacity of local plant and component suppliers with respect to elements of petrochemicals plants. This specifies their equipment, experience, quality capabilities, etc.

This information provides the basis for a variety of planned strategies of technological development for servicing the growth of the petrochemical sector. Alternatively, or in addition, it provides the basis for a service directly in support of 'unplanned', individual technological decision-making. It is not yet clear quite how the results of these studies will in fact be linked through to assist policy and decision-making at the sub-regional, national and/or enterprise level. However, it did seem clear to us that the developmental impact of these 'disaggregation and search' studies could be very substantial. Very small, marginal shifts between foreign and local technology supply, and/or very small marginal reductions (by 'better bargaining') in the unit costs of elements supplied, could, when applied to the very large investment sums involved, generate developmental benefits that would be many multiples of the sums invested in the initial policy research.

* We were told that planned expansion of this sector within the sub-region over the next three to five years was thought likely to involve a total investment around \$2 billion. Of this about \$600 million will be paid for technical knowledge (licenses, consulting, engineering designs, know-how, etc.) excluding plant and equipment.

The Technology Policy Group plan to synthesise in one report the earlier work on diagnostic, case-studies and on the general method for disaggregation and search. This should make the experience available for a wider international audience. In addition, this synthesis, plus the general experience of the Group, plus any achievements in the direct linkage to policy, decision-making and action will be used to try to effect a general change in the 'climate of opinion' in the sub-region about the acquisition of technology. The hope is that this will encourage individual entrepreneurs to take their own initiatives in this area, and that it will bring localised pressure to bear on national governments to adopt policies at least consistent with this approach to technology acquisition, and preferably in direct support of such an approach. We were not able to assess the likely effect on this indirect link between research output and policies, decisions and actions.

(ii) Andean Pact Programmes of Technological Development (PADT's)

The Andean Pact team recognised that a policy to optimise the use of foreign technology needed to be complemented by a policy which would stimulate local technical capabilities and which would eventually lead to the local generation of technology. The way in which the latter function has been approached has been through the PADT's - specific industrial programmes of technological development. This approach was formally approved in principle in Decision 84, and so far specific programmes have been designed for copper processing, tropical forest products, food processing industries and protein-enriched foods.

Each of the programmes involved an agreed plan of work necessitating cooperation between specific institutes in the participating countries. Not all countries of the region participate in all PADTs. For example, there were three countries participating in the copper ore processing programme, and five in the tropical forest products programme. Cooperation in the implementation of each of the PADTs goes far beyond cooperation in technical research and development. It includes cooperation in support services, training, the acquisition of foreign technology, and information networks. A committee is established for each of the sectoral programmes and this draws up a schedule of tasks, sets deadlines and allocates resources.

The copper and forestry PADTs were designed in Phase I. Their implementation has gone on concurrently with the initiation of other programmes in Phase II, but the financing of the implementation phase has come from other sources (including IDRC's Agriculture, Food and Nutrition Division).

As part of the Phase II project, the group is carrying out the research and analysis needed to draw up plans for PADTs in two new areas. One, food processing is already complete. The other is in the area of coal technology and work was due to begin on this in March 1977, and is due to be completed by February 1978. The group is considering the

possibility of developing PADT's in one or two other areas. The final output of the integrated research/analysis/planning-work is a detailed plan for the required technological activities.*

A large amount of time is spent in widespread discussions to build up the necessary institutional structure for implementation, to organise the respective institutional roles within the PADT, and to set up the various principles and mechanisms of cooperation. Only when this is all clear and agreed is the final planning document for the PADT drawn up for presentation to the Commission.

Different sectors have very different characteristics so that the PADT's have to be tailor-made for each sector. For example the copper ore processing industries are very different structurally from the tropical forest product industries. The respective PADT's consequently have different characteristics. For example, in the copper PADT final application of the results of the technological development programme will depend on a few large enterprises - often state controlled and/or linked to large multinational enterprises. In the forestry PADT final economic application depends on a host of very small, scattered, local enterprises. In fact, these two sectors were chosen as 'test cases'. The belief was that if the PADT concept could be made to work with significant results in these two very different sectors, then it could probably be made to work across a very wide range of production sectors in the economies of the sub-region.

The main 'output' or 'result' of this PADT component of the Phase II project will be the implementation of two or more packages of planned technological development activities. The speed with which the copper and forestry PADTs moved from plan to practice suggests that the implementation phase of any new PADT will follow quite rapidly behind the work in the Phase II project.

Because of the nature of the research/analysis/planning work lying behind the final PADT plan document, there will not be much by way of 'research output' as it is conventionally understood. Occasionally, intermediate research-based papers and reports are published, but the activity as a whole is far-removed from 'academic research' and its output is correspondingly different. In any case, the main value of this work to a wider audience is the methodology involved, and the group propose to produce a short publication of the methodology as an introduction to the series of PADT planning reports which will constitute the 'publications output' of the work.

* We were provided with a copy of this plan document for the PADT in the hydrometallurgy of copper. This is a document of 175 pages covering a diagnostic review of the problem area and the identification of technological solutions, a review of the technological state of the art relevant to the proposed lines of development, and detailed plans (timing, personnel, training, institutions, budgets, etc.) for the various activities needed.

The PADT approach to planning for cooperative, sector-technology, technological development work seemed to us to be excellent. On the one hand, analysis of the social, economic and political implications of technical change is put where it belongs - in advance of, and not after, the initiation of efforts to effect technical change. In addition, the carefully planned approach seems far more likely to actually lead to innovation and technical change, and to the development of appropriate local skills, than many earlier and prevailing approaches to these objectives which emphasise R & D planning to the exclusion of almost everything else. Finally, we would guess that the time consumed in the detailed research, analysis and planning of the PADTs will be more than adequately compensated by the speed with which developmental results will follow.

We regret that we did not have time to study in detail the operations and probable developmental consequences of any one of the PADTs. However, we believe that if they can be successfully implemented, the benefits to all the participating countries would be so evident that scientific and technological cooperation between the countries of the region could well endure even more drastic political crises within the Andean Pact than has been the case in the last few months.

(iii) Plans for a Technical Information System

The acquisition of information and its intra-regional exchange were seen, from a very early date, as critical requirements for (a) the implementation of sections of Decision 24, (b) the operation of Pact initiatives in the area of PADTs and the disaggregated acquisition of technology, and (c) the conduct of similar activities within the region but independently of the particular programmes initiated by the Pact. The Andean Pact team recognised that the region had need for two types of information about technology. The first of these was information about technological agreements which had been negotiated with different foreign firms in the region. The second was a need for specific technological information which would be useful both in the bargaining process and in the development of local technological capabilities.

With respect to the first need, the original objective had been to compile a very detailed data base about all agreements and contracts with foreign firms. In a first phase, basic data about foreign investors and technology would be compiled. In a second phase much more detailed information about their technological behaviour and economic performance would be added. This system would serve two purposes. On the one hand the system would constitute a kind of permanent, on-going research project to keep policy-making constantly informed about this area of concern. On the other hand, it would be used to support bargaining and decision-making in individual cases of investment or technology acquisition.

During the latter part of Phase I and the early part of Phase II, plans were drawn up for a system of this type. The group now realise that, even within the initial political climate of the Pact, this was probably over-ambitious. There was likely to be considerable resistance

to the release of the information needed by enterprises and national governments, and to its compilation within a centralised system. The changing political climate has certainly aggravated these inherent problems. Before the plans could be put to the Commission as the basis for a formal Decision, the political changes within the member countries led to a major debate within the Pact about Decision 24. Since the information system was, in large measure to help in the negotiations on foreign investment which was at the heart of Decision 24, it seemed an inappropriate time to propose this new information scheme. However, informal moves have been made to close the gap between plans and practice. Modifications will have to be made to the original proposal, and the research-based plans need to be 'translated' into a legal document. When this has been done, it will be submitted to the Commission for formal approval - probably together with the plans for dealing with the second type of information used.

The plans for dealing with the technical information needs were relatively simple. This simplicity stemmed in large part from the observation (mainly prior to, and during, Phase I) of the way technical information-users functioned - both within the region and in more industrialised countries. It became clear that such users did not require direct access to masses of technical information per se.

What was needed was a system which could link users, often with rather vaguely specified needs, to the multiplicity of existing access points into the world's stock of technical knowledge and information. In addition, since the need was very often not for information per se but for the knowledge and services of people with information and know-how, a system which was linked to access points or to sources (people and institutions) was likely to be more useful than one which was linked to disembodied information. Moreover, the system itself would be simpler and cheaper.

Having developed this approach to meeting technical information needs in the sub-region, the group developed more concrete plans for an operational system. Once again, initial, informal steps have been taken to move from plan to practice. However, although this component of the work on information systems is less closely tied than the other to the contentious problem areas surrounding Decision 24, progress has been blocked. Future plans for the work of the group will almost certainly incorporate activities to move this area of work towards implementation.

11. AN ASSESSMENT OF SOME ASPECTS OF THE ANDEAN PACT TECHNOLOGY POLICY PROJECT

The first sections of this report have provided a fairly factual summary of what has happened in the course of the Andean Pact/IDRC collaboration on technology policy studies. The next sections contain a more subjective assessment of some aspects of this programme - with particular reference to Phase II. The earlier remarks in Section I about the limitation of our own review exercise should be borne in mind throughout.

A. Objectives of the Project

The question we address is whether, in hindsight, the original objectives and any subsequent changes in these were appropriate, and realistic objectives. Appropriateness in this context is assessed particularly with reference to IDRC.

The overriding objective of the whole project was to prepare policy proposals. Research was not to be carried out as an end in itself, but only as an aid to policy formulation. Thus research and analysis were to be part of an integrated project set up to produce plans and, although 'research reports' might well be produced en-route, the destination was the submission of operational, plan documents to the Commission.

A project with this type of objective is relatively unusual among the policy-related research supported by the Centre. However, it seems wholly appropriate that the portfolio of projects supported by the Centre should incorporate some projects of this type.

This overall objective of producing research-based plans was qualified. The plans had to relate closely to other developments and policy initiatives under consideration by the Member States of the Pact. This approach of setting the technology policy work within the context of related policy developments (for example, in this case, Decision 24, or the industrial integration proposals) seems to us to be preferable to treating technology policy questions in isolation.*

Another qualification to the basic objective of the project was that the planning activities should relate to operational programmes with relatively short-term 'pay-off' periods. This objective was reinforced during the course of Phase II. Again, on its own, this objective does not raise any questions in our minds. However, the question of possible conflict with other objectives has to be considered.

* Another large Centre-supported project (STPI) is in fact based on the assumption that technological development is inextricably interrelated with other dimensions of the development process, and that one requirement for technology policy research is to understand these interrelationships better.

Conflict might arise, for example, between this objective and longer-term objectives relating to the research activity itself. We were not able to explore this question in any detail, but some features of the work seem to indicate that overall research strategy objectives were probably not compromised. For example, in the PAST work carried out alongside Phase I, the objective of seeking rapid pay-off did not prevent the selection of problem areas that would simultaneously contribute to a greater understanding of the broader policy issues involved (the deliberate selection of programmes relating to sectors with contrasting structures of production enterprise).

Did the weight of this objective in Phase II compromise the research work at a more detailed level? Again, we have little information upon which to base a judgement. Within the work of the particular sub-projects, we believe that the effect was small but not insignificant. For example, the initial Junta proposal for work in the 'disaggregation' sub-project referred to a general 'evaluation' of requirements for learning-by-doing that would guide the formulation of policy at both general and specific project levels. Although this work was described as being "of particular interest", it was not presented during the review as a component of the work programme. This apparent shift away from diagnostic types of research with general policy implications towards more specific types of planning-oriented analysis has probably occurred in varying degrees within all the active sub-projects. It may have been the consequence of a number of factors. However, we believe that the greater emphasis given to the 'short-term pay-off' objective, which was a consequence of changes in the wider context of the group's work, contributed to this shifting intra-project emphasis.

The changing emphasis on this objective seems also to have had a significant effect on the balance of work between the different sub-projects. In formulating its proposal to the Centre, the Technology Policy Group had to specify a number of discrete projects to be undertaken during the course of the grant period. This was done more than a year before the work began. As mentioned above in Section II, the changing political climate led to a revision of the portfolio of sub-projects. Following discussions with Dr. Oldham, and with the full agreement of the Centre, two of the five initial sub-projects were discontinued and the funds re-allocated to the remaining three areas of work. The discontinued sub-projects were the two which were of a more diagnostic (or 'academic') type and which did not involve any immediate planning activity.

In this way, the reinforced objective of seeking rapid and visible results altered the initial balance within the project between research activity and planning activity. We were, and remain, fully sympathetic to the reasons for this change. However, one should not forget the important role that had been played before and during Phase I by diagnostic research related to general policy concerns. In retrospect, we wonder whether the reduced weight of research within the whole set of activities in the Project was appropriate from the IDRC's point of view. We wonder whether it might have been possible to find some arrangement whereby the balance of research activity within the total might have been maintained, while at the same time maintaining the ability of the Technology Policy Group to respond as it felt appropriate to the changing situation. For example, would it perhaps have been possible to arrange some form of subcontracted execution of the discontinued research projects while reinforcing the research-based planning activities of the group directly servicing the Andean Pact?

IDRC-supported research projects usually incorporate objectives other than those concerned with the research product - be that research reports or research-based plans. Training and communication of successful research results to other groups, are two such objectives.

The final project proposal incorporated specific reference to three types of training activity that would be involved in the Phase II project.

- (a) Training of those recruited to the Technology Policy Group of the Junta.
- (b) Training of technology policy research and implementing personnel in the member countries of the Pact.
- (c) Training of personnel who would be involved in following up and implementing the various operational plans.

We raise no questions about the appropriateness of these objectives as such. They seem admirably aligned with IDRC objectives. However, it is worth noting that the original draft proposals from the Junta referred only to training in the last of the three categories. Explicit reference to the first two was a result of discussions of this initial proposal between the Centre and the Junta. It seems appropriate, then, to question how firmly committed the Junta was to these two sub-objectives concerned with training.

The importance of this point is reinforced by the fact that no explicit budget allocation was made for training activities. Those were to be carried out by the core group of four researchers whose costs were to be covered by the Junta block contribution to the project funding. This should be borne in mind when we review below the actual performance of the project with respect to training.

The proposal for Phase II made no explicit mention of the dissemination of research results to an audience wider than that within the Pact countries that would be immediately concerned with the work of the Technology Policy Group. It is clear that this objective was largely taken for granted. This is quite understandable. At the time the proposal was being developed and discussed, work had already begun on the two IDRC-published reports on the work of Phase I. At the same time, the Director of the Group (Dr. Vaitzos) had already begun publishing papers and books drawing on the work carried out by the Group. There seemed no reason to doubt that a similar set of activities would follow from Phase II. In retrospect, however, and bearing in mind the pressures that can be (and, in this case, were) brought to bear on a research activity that is very closely linked to a policy-making institution, we consider that it might have been useful to have made this type of objective more explicit in some way.

B. The Methodology Used in the Project

We wholeheartedly approve of the overall design of the strategy for research, analysis, policy development and planning that guided the development of the whole Programme of work (Phases I and II together). This strategy was conceived as one which progressed systematically, and in an integrated manner, from the general to the specific. Initial work, largely in Phase I, was concerned essentially with the diagnosis of general problems and with the formulation of broad policy guidelines. It was, however, based on very specific pieces of research, and was informed by the awareness of problems that would have to be tackled at a detailed level. The work in Phase II drew on the more general diagnoses and moved forward to the definition of more specific activities which would both reinforce the broad policy approaches and be consistent with them.

This strategy of research may seem so self-evidently sensible as not to merit any comment. However, it is surprisingly unusual. Much technology policy research, and even more science policy research, has been concerned with general diagnosis and, at best, with broad policy formulation. Too often, it has gone no further. On the other hand, there has been much research in this area that has related only to very narrow policy problems. To the extent that it has led to altered policy and practice, it has too often amounted to 'ad-hocery' that has been inconsistent both with other pieces of 'ad-hocery' and with the broader context of policy and practice into which it has been inserted.

We are not suggesting that the whole set of policies and plans emanating from the research by the Technology Policy Group of the Andean Pact is comprehensively integrated within itself and interrelated with other policy structures in the sub-region. However, the overall design of the work seems to have been concerned with that as an ideal, and in practice it has taken some significant steps towards achieving that ideal.

Equally admirable, and perhaps equally self-evidently sensible but unusual, has been the conception of the approach to technology policy research. Much research in this area, and too much of the consequential approaches to policy, have been based on a conception of the problem area that cuts it up inappropriately. Phase II of the work of the Andean Pact Group was based on a perception of the realities of the world in which different types of technological activity are interlinked and interdependent. The acquisition of foreign technology, the execution of local R & D, the local dissemination of technology and techniques, the development of technological capabilities, the supply of engineering services and the production of capital goods were not, for example, seen as 'separate problems'.

The design of the research and planning was based on sub-divisions of the production system into sectors and subsectors. Each of the sub-projects, and each of the sub-divisions of work within those, was focussed on such a production-centred problem area. To a large extent each of these units of research and planning work was then concerned with a set of interrelated technological activities.

Fairly obviously, this conceptual basis for the approach to the research could not be totally comprehensive. Not all the technological activities relating to the performance of a sub-sector of the economy were dealt with within each of the units of work in the project. For example, the 'disaggregation studies are focussed primarily on the acquisition of known technology and of existing types of capital goods, but they do cut across questions about international transfer of technology, local engineering capabilities and the local supply of plant and equipment. Similarly, the PADT projects are primarily concerned with generating new technology or developing new techniques; but these also cut across a spectrum of different technological activities that more usually are approached separately.

This raises one question in our minds about the overall design of the work in Phase II. In principle, it would have been possible to focus the PADT 'disaggregation', and information system sub-projects onto the same sub-sectors of the economy. In this way, the different sub-projects would have directly reinforced each other. To a certain extent this already happened. This was mainly as a result of overlaps between the information system work and each of the other two active areas. However, the PADT and disaggregation studies did not overlap, and did not seem directly to complement each other.

We wonder, therefore, whether the overall design of the Phase II project might have taken a more integrated approach - at least for part of the work undertaken. If the group has in mind the development of integrated approaches to long-term, sectoral, technology planning, then it might have been useful to 'experiment' with this at a fairly early stage, and to examine the methods and problems involved. Perhaps this is an area where the weight of the 'short-term pay-off' objective influenced the overall design of the research strategy.

In the case of the PADT work we did meet the staff responsible for the research, analysis and plan formulation for three PADTs. However, the methodology involved in their work still remains something of a mystery to us. Perhaps this is because, except at a general level, it was highly variable between the different PADTs. At the detailed level the process of work seems to have been largely ad hoc - depending mainly on the existing knowledge and previous experience of the individual concerned, and on the availability of the necessary information. 'Ad hoc' does not mean 'bad'. Adequacy for the job on hand, rather than adequacy for the formalities of more academic research, seems to have been the dominant criterion in determining the methodology used. Again, to the extent that we can judge from results, this approach seems to have been quite successful.

Given the nature of the sub-projects in Phase II, we should be concerned not only with the methodology of research, but also with the methods used to move on from these to produce plan proposals. However, here again we remain a little in the dark. In outline four phases seem to be involved. First, the analysis of the information to produce an outline or draft plan. Second, the

review of this from the point of view of different disciplines within the Technology Policy Group. Third, the discussion and modification of the draft with the different institutions. Finally, the transformation of an agreed plan of action into the legal formulation necessary for submission to the Commission. The second and third steps were not necessarily sequential. Indeed, they seem to have overlapped in most cases. However, we do not really know in any detail what happens in these steps. Once again, we can only comment that, at least in the case of the two PADTs that have passed through these steps, whatever the method may be, it seems to work.

It should be obvious that much of the output of the Phase II project consists of policy innovations - almost policy experiments. These are novelties not only within the sub-region, but within the developing world as a whole. At the same time, the Technology Policy Group within the Pact is, as we have noted above, under pressure to demonstrate developmental results - rapidly. Both of these issues raise a question about methodology at the level of design of the structure of the work programme. Experiments merit monitoring, and the need to demonstrate results requires that those results be identified and, if possible, measured in some way.

The Technology Policy Group can already point to cases of developmental 'impact' of their work, and they plan to accumulate this type of information as it becomes available. However, this monitoring activity seems to be relatively unsystematic. It is certainly not set up as a specific sub-area of research activity. Even to meet their own political requirements, the group will need to ensure that the information about impact is (a) reasonably comprehensive, and (b) convincingly credible. In effect, they must be able to note:

- that the area of economic activity to which their work relates has in fact changed in some way;
- that, taking account of the various complementary changes and costs involved, the net changes are valuable; and
- that the changes can be reasonably ascribed to their own work and not simply to the passage of time or solely to the work of other agencies.

The need for credibility and comprehensiveness is reinforced by the fact that political and economic forces that are opposed to the work of the Pact are mounting an increasingly explicit offensive to demonstrate the desirability of policy approaches other than those currently pursued by the Pact. Comprehensive and credible reviews of 'impact' will be all the more necessary. This in turn is reinforced by the possible significance of their work for other parts of the developing world.

We wonder, therefore, whether the design of the research portfolio of the Andean Pact Group should not already have incorporated an element of work to meet the needs for reasonably systematic monitoring of the 'impact' of their work.

C. Organisation of the Research Team

The success of any research project, including its policy impact, obviously depends on the quality of the research team, their interrelationships, and the relationships they develop with other groups. It is worthwhile for IDRC to make some assessment of this aspect of the Andean Pact Project, since it may affect the future patterns of organisation of other research projects, and since it also has funding implications.

The Andean Pact team was interdisciplinary, and consisted of both natural and social scientists, engineers and lawyers. The interdisciplinary nature was considered to be very important by the team itself. It clearly had been particularly relevant in getting the multidisciplinary commentary on all the proposals for policy which were made. It was difficult for us, as outsiders, to judge how the team acted in an interdisciplinary manner during the research phase. During the first phase of the project there was a sufficient number of people (between eleven and fourteen) to give reality to the claim of interdisciplinarity. However, at the present time in Phase II, there are only two full time members working on technology. An interdisciplinary approach to the work is clearly impossible at this level of staffing. Although we understand that the team of two is able to draw on the expertise of people from other departments in the Junta when this is needed.

The low level of staffing of the Project not only affected the ability to carry out interdisciplinary work in the context of an enthusiastic, lively team. It clearly had a negative effect on the ability of the group to meet many of its other objectives - at least within the foreseeable future. There were two components of this understaffing situation. On the one hand, the number of full-time core staff supported by Junta funds was below that planned. On the other hand, the use of IDRC funds to employ personnel for particular Phase II sub-projects was obviously far behind what was planned - even following the rescheduling after the delayed start.

We have already indicated a number of reasons why external events had led to a slow-down of the various sub-projects. Not only did the changing political climate for the work create a need for stalling or reorienting some of the work. Perhaps even more significant has been the extra time which members of the team have had to spend in trying to convince politicians of the merits of their technology policy proposals. This was a much more time-consuming activity than any of the members had originally estimated. To this should be added, of course, the recent change in the Director of the Programme and a consequent delay while the new Director sought to reorient and re-plan some of the activities.

Thus the low level of core staff supported by Andean Pact funds was not only a serious limitation in itself, it was also a severe constraint on the ability to use IDRC funds as planned. The Phase II proposal had envisaged the commitment of \$130,000 per year by the Junta to support a core group of four or

five research staff, plus a further \$50,000 for secretarial assistance and supplies.* It was quite apparent that the actual level of local funding was running far below this at the time of our review, and had been doing so for some time. This issue was discussed with two of the three members of the Junta at the end of our review, since it clearly reflects a decreased commitment to the total project on the part of the Andean Pact.** We were assured that one additional post has been allocated for the technology policy team but it is unlikely that it will grow beyond this size in the immediate future.

D. Output from the Project

Given the delays to the work programme that have affected the Phase II project, it probably is too early to make detailed comments on the various 'outputs' of the work. Nevertheless, it is possible to make some preliminary remarks about three types of output: policy impact, research results, and training.

(i) Policy Impact

We would wish to stress once again that both Phases I and II of the Andean Pact Technology Policy work were not purely research projects. The main objective was to formulate policies (mainly Phase I) and to develop operational plans (mainly Phase II). Research, as a component of the work programme, was to be a means to those ends.

There can be little doubt about the policy impact of this project. It must rank as one of the most productive of all IDRC projects from this point of view. Phase I resulted in the White Paper and the Decisions 84 and 85. Phase II has already led to several specific Technology Development Programmes. Indeed the project has received international recognition as a pioneering effort of significance to the whole of the developing world.

In any context, these actual and potential achievements in developing accepted policies and plans for technological development would be remarkable. In the context of the complicated decision-making processes of a regional grouping of differing nation-states, and in the context of a fluctuating political context for such a grouping, these achievements are even more impressive.

(ii) Research Results

Just as the whole project was not solely a research exercise, it was not solely a policy-making exercise either. Part of the work should have contributed to new knowledge about the relevant phenomena, about methods of analysing problem areas, or about methods of moving from diagnoses to planned solutions.

* One should perhaps note that this level of local funding had been indicated in the first proposal from the Junta. It was not the result of subsequent discussions with IDRC.

** We do not know whether this reflects a decreased commitment to the technology policy work relative to other activities of the Pact or whether it reflects a reduced allocation of resources to the Pact's work as a whole.

However, in view of the considerable sums of money invested both by the IDRC and the Andean Pact, it seems to us that the totality of the published research output is surprisingly sparse.

These generalisations must immediately be qualified. These comments are much less true of Phase I than of Phase II. The former generated some new data about the way technology was used in the region; it developed new concepts relevant both to diagnosing problem areas and to formulating solutions; and it explored new methods for developing policy initiatives. A second qualification must obviously be that the work planned for Phase II is far from complete. Methodological reports will be prepared for the PADT and disaggregation studies. These are likely to make new contributions to knowledge.

Whether a more specific concern with research output would have been desirable is hard to say. The team consisted of research oriented people, some of whom simultaneously wrote and published more academic books and papers outside the scope of the programme. The official view of the Junta is that theirs is not an academic institution and hence, that they would accord a relatively low priority to the production of research results. However, from IDRC's point of view, and from the point of view of other countries wishing to draw on the Andean Pact experience, it would probably have been useful to have had a somewhat clearer articulation of research output.

(iii) Training of Researchers and Education of Policy-Makers

An important feature of all IDRC projects is considered to be the training aspect. Several levels of training and education were considered by the Andean Pact team.

- (a) The training of researchers capable of doing studies and research on technology policy problems.

When Phase I of the project began, relatively few of the members of the large team had prior experience of doing technology policy research. It was decided that most of the training that would be provided for these people would be on-the-job training. In addition, however, a number of more formal seminars and guided reading programmes were established. This seems to have worked very satisfactorily during Phase I. During Phase II of the project, however, relatively few people were engaged in the project and these were people with considerable experience. Hence further specific training activities were not carried out. It seems to us that an excellent opportunity for training young people, capable of continuing the sort of studies/policy formulation activities of the Pact has been missed.

- (b) Education of national governments and policy makers in the role of technology in development.

This was seen as an important task by members of the technology policy team. They recognised that without a climate of opinion favourable to technology there would be little chance of the technological decisions of the Pact being approved and implemented. As a consequence, members of the team gave a number of talks and participated in seminars at which they attempted to spread the message of science, technology and development.

- (c) Education and training of national groups working on technology policy problems.

There seems to have been relatively little interaction between the studies carried out at a national level by national government groups. Certainly there is little evidence of people from national groups receiving any form of training at the Junta headquarters in Lima. This is in part explained by lack of resources and higher priorities for the time of people employed. We were told on more than one occasion that the Junta is not an academic institution and hence that general education, like research, must have a relatively low priority.

In our own view - largely because of, and not in spite of, the general objectives of the group - this may be an overly narrow perspective. On the one hand acceptance and the implementation of the policies and programmes put forward by the Pact depend on the enthusiasm and active support of those engaged in technology policy work at the national level. Had national technology policy groups been involved in, and educated about, the detailed research and planning work of the Junta group, this might have contributed significantly to developing that enthusiasm and support.

Furthermore, in our wider discussions with a number of people engaged in technology policy work in different countries in the region, we were made aware of a degree of resentment against the Technology Policy Group of the Pact. As often as not, this resentment was not so much based on differences about the substantive content of the work being done as on the view that it was being done by a centralised 'them' without much involvement of the decentralised 'us'. These views may not matter very much, and there may be many reasons for their existence. However, we believe that their existence adds at least some weight to our belief that the development of training/educational links between the Pact Group and other technology policy groups in the region might have been desirable - even from the point of view of the particular objectives of the Secretariat.

- (d) Education and training of researchers and policy makers outside the region.

When the IDRC Board approved Phase I of the Andean Pact, a request was made by some of the Governors that the lessons and results of this project be disseminated widely among other groups interested in technology and regional integration. This request was relayed to the technology policy group in Lima and they have responded well to requests for help in dissemination and training. Members of the team have assisted with the definition of research programmes in technology policy studies in Central America, and have also provided training and attended seminars organised by the IDRC-supported Caribbean Technology Policy Research Group. In addition, they have made important inputs to discussions within the United Nations, especially at UNCTAD.

With specific reference to Phase II, Dr. Soto was quite prepared to explore with the Centre ways in which the experience of the Andean Pact Group could be disseminated more widely within the Third World.

- (e) Education and training of those who will be involved in detailed implementation of the plans developed by the group.

The Junta group has been quite actively involved in developing the skills and capabilities of those engaged in the implementation phase of the programmes, for example in the copper and forestry PADTs. Even in the pre-implementation phase, they have been involved in this type of activity - for example, in connection with the information system project.

The issue of training obviously poses the Junta with a serious dilemma. Given more resources, more training might have been provided. But equally, given more resources, more experienced people could have been hired, who could have helped to develop new PADTs and new schemes of disaggregation. There is a conflict of interests and it is not easy to pass judgement on whether the right balance was attained.

In hindsight, we would have preferred more time to have been spent on training younger people who would go on to become researchers/policy makers in the field of science and technology policy research. The appropriateness of this view is perhaps indicated by the constraints on progress that seem to be imposed by the current workload of the small core group of researchers - especially following the resignation of the previous Director.

Also in hindsight, there would have been in our estimation, advantages from establishing closer linkages with the national groups working on technology policy problems and these linkages might have included training opportunities for people from the countries to work with the team in Lima.

E. Relations Between the IDRC and the Andean Pact

The relationship between the Andean Pact Technology Policy Group and the IDRC has remained cordial throughout the five years of the project. However, it must be recognised that the IDRC took a stance of non-involvement in the conduct of the research which is more liberal than in the case of many of the projects which the Centre supports. The reason for this was the high level of competence of the scientists involved in the Andean Pact Project and the level of trust in their judgement which the IDRC possessed.

The IDRC Associate Director for Science and Technology Policy Research monitored the progress of the Andean Pact team at about six-monthly intervals. This was through an exchange of correspondence between Vaitos and himself, and by means of periodic visits to Lima by Oldham and during the annual visits of Vaitos to Sussex. The level of trust and freedom was appreciated by the Andean Pact team and has contributed to the continuing good relations, even when the original leader of the programme left the Group and a successor was appointed. However, one point became half-apparent during the review. The link between the Centre and the Technology Policy Group had been confined nearly exclusively to the personal communication between the IDRC Associate Director and the Director of the Group. Moreover, these communications had

taken place largely by correspondence and by meetings outside Lima. This was not so much by design as the result of (a) the fortunate fact that Dr. Vaitos frequently visited Sussex, and (b) the unfortunate fact that Dr. Oldham's available time just did not permit the development of a more diversified set of contacts with the group through more frequent visits to Lima.

The nature of this relationship between the Centre and the Project gave rise to potential difficulties when the Directorship of the Group changed hands. The chance to meet during the review quickly removed these. It is also probable that more frequent visits to Lima would have enabled the Centre to have earlier warning of some of the difficulties faced by the group, and may have allowed the Centre to have given earlier assistance in overcoming some of them.

One aspect of these good relations was stressed to us during our review. The Andean Pact Technology Policy team paid tribute to the IDRC administration for its flexible approach and willingness to consider the reallocation of resources when changing circumstances led to a need to change the Phase II priorities and project structure. The ability to discuss problems on a professional basis between the team and the IDRC made the grant more of a programme grant and this was recognised to be of great benefit to the work. That this was possible was in no small measure due to the high competence of the team and the trust that IDRC staff had in their judgements.

IV. SOME LESSONS THAT MAY BE LEARNED BY IDRC

In the previous sections we have tried to lay the basis for drawing out some of the lessons that may be learned from this review of the Andean Pact/IDRC Project. In making this assessment we have tried to be as frank as possible. There is no need for the reader to search 'between the lines' of the previous sections for veiled criticisms that really go further than is indicated. We have tried to make our subjective judgements quite explicit. Others may disagree with our judgements, and they may have others to make, but we hope that they need not look for 'pulled punches'.

This means that our general assessment of this project was firmly positive. Although we raise questions about some aspects, we responded to the discussions with enthusiasm and with considerable respect for what has been achieved and for those who have achieved it. We have no hesitation in recording our view that, even before it is completed, this has been a most impressive project. Overall, then, the main lesson is that the support of this project has been a good, and well managed allocation of Centre resources.

Furthermore it illustrates the operational value of science and technology policy research. There has been a logical progression from policy studies and research which first led to the establishment of broad philosophical guidelines about how science and technology can best contribute to industrialisation in the Andean region. Further "policy" research led to the design of plans for scientific and technological activities relevant to the development of specific industrial sectors but falling within the previously established guidelines. Some of these activities included scientific research which itself falls within the scope of other IDRC programmes. The forestry project which was founded as a part of the Agricultural Food and Nutrition Division programme is one such example. Other of the activities which were 'planned' as a result of the 'policy' research are productive activities and do not qualify for the research support. They do however contribute to industrial development and some have qualified for support by other donor agencies such as CIDA.

The specific lessons/recommendations for IDRC which we believe follow from this review are:

- (a) The conduct of research within a policy-making institution, and as an integral part of policy-formulating or programme-planning, clearly enhances the probability that policy-relevant research will actually have an influence on policy, and later, on action. Without losing sight of the value and importance of other types of technology policy research that may be carried out in other types of institutions, the Centre should continue to be ready to support this type of research in which research, analysis, policy-formulation and planning are clearly interconnected. In addition, the Centre should, whenever appropriate, encourage the establishment and development of research/analysis groups within institutional contexts where this type of research is most likely to flourish.

- (b) The Andean Pact project demonstrates, we believe, the value, indeed the necessity, of being able to support this type of work by this type of group over a relatively long period. The need for continuity of funding over a relatively long period of time for a programme which moves in an iterative way between research, policy formulation and policy implementation is a need which should be recognised by the IDRC. For these types of projects it may be necessary to provide longer-term funding than with projects which are solely concerned with research.
- (c) Within this type of work, the Andean Pact project demonstrates the need for flexibility on the part of both the team supported and the external supporting agency. While more academic research activity can be disrupted by external events, it is usually much more insulated from the vicissitudes of bureaucracies and political institutions than is research-based planning and policy development activity. However, from the point of view of the Centre and its responsibilities, this flexibility is only possible if it is based on an unusually high level of confidence in the capabilities of the team concerned. This suggests that projects of this type should not be entered into lightly. However attractive they may be in terms of their probable developmental usefulness they imply a set of commitments, and may generate a set of problems, that are different from, and usually greater than, those encountered in the case of projects that are more strictly concerned with research.
- (d) Our comments about the training activity within this project highlights some important issues. It seems clear that the group accorded a low priority to the conduct of training and education - even of technology policy analysts within their own group. The inclusion in the proposal of explicit objectives about training was probably due more to 'Centre influence' than to their own concern with this. Should this influence have been exerted? We believe that the answer is "Yes". Obviously, Centre staff should make known to potential grant recipients the general types of objectives pursued by the Centre, and the development of skills and capabilities is one such objective. Moreover, in many cases, Centre staff may have a broad experience of the problems potentials and achievements of a large number of projects. This may include experience of the value and importance of explicit training activities within projects. It seems quite proper that this experience should be made available to applicants for Centre funds.*

Was the Centre's influence on the question of training most effectively exerted? We think that the answer is probably "No". Having raised the question of training (or of any other Centre concern about a project) Centre staff face two possibilities. Their views may be disregarded, or they may be accepted. If they are disregarded there is no further problem - except to assess whether this affects the acceptability of the project. However, if they are accepted, the implication is that further action may be necessary. It may be necessary to help the grant applicant build the activity concerned

* In this particular case, the advantage of hindsight allows us to be even more certain on this point. Dr. Soto and Dr. Vaitasos both agreed with our judgement that at least some of the problems faced by the group during late 1976 would probably have been eased if some form of in-house training activity had been undertaken at an earlier stage.

into the proposal in a mutually acceptable way. In this case, however, the issue seems to have stuck in a half-way situation. The principle of training was accepted to the point of making some general statements in the proposal, but the content of the activity was never specified, and the necessary fund allocations were not clearly identified. They were neither incorporated into the Centre component of the budget, nor (as far as we know) were they clearly separated out as a line-item in the Junta budget. Given the initial lack of interest in the subject on the part of the group it seems, with hindsight, fairly predictable that not much would happen with the issue left in this situation.

We therefore conclude with the generalisation that, when preliminary discussions with a grant applicant result in the acceptance of a point of concern to the Centre, these discussions should be followed through to make explicit the implications in terms of activities and budget allocations.

- (e) The Andean Pact project illustrates a problem area that may be reasonably general with such types of project. The closer one moves from research *per se* towards the practicalities of policy-formulation and planning, the more pressing and dominant are likely to be shorter-run and day-to-day concerns. This is likely to be so even without the type of political context which, as in the case of the Andean Pact, reinforces a concern with rapid results. Activities with longer-term implications, for example diagnostic research, are likely to receive lower priority. Yet the history of the whole Andean Pact project also demonstrates the value of such longer-term diagnostic research activity.

We should note, therefore, that, when a project (or proposal) contains a combination of work with long and short-run implications, it may be desirable to try to take actions which will help grant recipients carry out the former while maintaining their priority concern with the latter. In practice, this may involve an attempt to find some mechanism which will at least partly insulate the longer-term work from the pressure of short-term objectives, while at the same time maintaining the linkage between the more 'academic' research and the practicalities and realities of planning and policy-formulation. In the particular case of the Andean Pact, some form of sub-contracting mechanism might have been suggested to avoid discontinuing the two research projects with relatively long-term implications.

- (f) One feature of the Andean Pact project makes it unique among Centre-supported Technology Policy Projects. However, this feature may become more common. The project was neither a network project with research groups from different countries cooperating in the work; nor was it a single-country project with significant implications for other countries. The work was carried out centrally by a single institution 'on behalf of' a number of countries. In the previous

section we noted various aspects of the degree of centralisation in the execution of a project which ultimately required action at the national level. In some respects we believe that it would have been desirable if the project had involved a greater degree of decentralisation or at least linkage with the science and technology policy groups operating at the national level.

It may well be quite natural for such centralised research and planning groups - perhaps especially newly created groups - to emphasise centralisation at the expense of decentralisation and wider involvement. When responding to grant applications from such centralised institutions concerned with research-based policy formulation,* we should take note of this experience. Where appropriate it would seem desirable to encourage grant applicants to build explicit activities into their proposed work programme in order to counteract the tendency towards overcentralisation.

- (g) In the previous section we noted that the Andean Pact Group had not yet adopted a systematic procedure for monitoring the developmental impact of the implementation of their policies and plans. Nor did their current research activities seem to incorporate elements that would be valuable contributions to any retrospective evaluation of 'impact' which might be carried out at a future date. We believe that such activities would be extremely valuable components of any project that was (a) operating over a relatively long period, and (b) operating close to the stage of action and implementation. In general we believe that elements of impact-monitoring work can be very much more useful than retrospective 'evaluations' - at the very least they can be very valuable complements to such ex post assessments.

We suggest that the Centre should bear this in mind in connection with any similar projects in the future. It is, of course, seldom possible to predict at the start of a project whether such an activity will be valuable. However, it would probably be desirable if initial proposals for action-related work at least carried some reference to the possibility of undertaking such work. At the same time, the Centre should stand ready to encourage and support such work should it appear to be valuable.

- (h) In the previous section we noted that it might have been desirable to maintain a slightly different type of closer contact between the Centre and the group carrying it out. This has broader implications for the availability of staff time to develop and maintain such contacts. Nevertheless, we believe that the allocation of Centre resources to permit adequate monitoring to take place, particularly in long complex projects of this type would be amply repaid by the benefits to both parties to the contract.

* In some respects the major international centres of agricultural research have incurred this type of criticism.

- (i) The staff of the Andean Pact Group recognised the contribution that they could make to the development of technology policy research and formulation in the Third World outside the Pact region. They also recognised IDRC's wider responsibilities and obligations in this respect. The Centre should continue these discussions and proceed from these to make available, in appropriate ways, to a wider audience the working experience and results of the group.
- (j) What did we learn about the review procedure itself that was used in this case? It was certainly preferable for both parties to the procedure used in Phase I. Obviously it was limited, and what we can learn from it is correspondingly limited. We believe that the overall cost-effectiveness of the exercise might have been higher had it incorporated a component which discussed the Project more systematically at the level of the member states involved in the Pact - but only slightly in the Project. In addition, we believe that it would have been useful if the exercise had been less exclusively office-based. Our understanding of the work would have been much enhanced if we had had the opportunity even for glimpses of the realities lying behind the paper-work.

Whether either of these additional components would have significantly changed our assessment, we cannot say. They would probably have added to what we have learned. However, once again, the implications for Centre staff time are not trivial, and we believe that the exercise, as it was, was valuable and useful to the Centre.