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Fabio Erber
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DEVELOPMENT BANKS AND TECHNOLOGICAL DEVELOPMENT

A Research Proposal for a Comparative Study

Submitted to the International Development Research Centre (IDRC) of Canada, the Organisation of American States (OAS), Organisation for Economic Co-operation and Development (OECD) and the World Bank

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This proposal was prepared by Fabio S. Erber, currently with the Instituto de Economia Industrial of the Universidade Federal do Rio de Janeiro (IEI/UFRJ). He was asked to write this on behalf of seven country research teams, which will be involved in the proposed study. These include:

1. Association Nacional de Ingenieros		(Argentina)
2. Fundaçao Getulio Vargas 3. IEI/UFRJ	(jointly)	(Brazil)
4. COLCIENCIAS		(Colombia)
5. National Research Development Corporation		(India)
6. El Colegio de Mexico		(Mexico)
7. Grupo de Análisis para el Desarrollo		(Peru)

I. General Objectives

This is a proposal to study in a comparative framework the role of Development Banks in less-developed countries as regards local technological development, a role which has not been researched yet despite its importance for LDCs' development. The main objectives of the project are:

- To describe and evaluate the experience of Development Banks in LDCs as regards its positive and negative influence in local technological development.

- To place such experience in the broader context of the countries' financial system and Governments' policies, especially their science and technology policy.

- To suggest to policy-makers of the Development Banks and of the Government measures to improve the effectiveness of the Banks' action as promoters of local technological development and, by extension, of social and economic development.

The project represents a pioneer effort in technology policy research (in LDCs and elsewhere) and it will also produce results of immediate relevance to policy-makers involved with local technological development in LDCs, in the Development Banks and in the Government.

The studies will be carried out in Argentina, Brazil, Colombia, India, Ivory Coast, Korea, Malaysia and Peru. The

comparative framework of the project will not only provide a basis for better policy suggestions and, in the final stage, shall have research and policy conclusions applicable not only to the countries participating in the project, but also to other countries, as well as international agencies and research and financial institutions of the advanced countries.

II. The Role of Development Banks and Technological Development in LDCs

Studies of economic history have shown that since the last century, financial institutions have played a key role in the process of development of the now industrialized countries such as Italy, France, Germany, the United States, the USSR and Japan. Especially since the second post-war period, less-developed countries' (LDCs) Governments have made strenuous efforts to develop local financial systems -- often with the help of international agencies such as the World Bank and advanced countries' Governments.

In most LDCs the Governments have set up Development Banks (DBs), generally to provide long-term local funds for investment projects which could not be financed otherwise -- either because of their size or because of the difference between social and private costs benefits -- as well as to channel resources from international or foreign agencies.

In general, such Development Banks have become a key policy instrument for their countries' economic development -- as is the case of the countries participating in this project. In many countries, e.g., Brazil, Peru, they are the main (sometimes the sole) source of long-term financing in the country, besides participating actively in the channeling of foreign resources for local development. In many DBs operations cover a wide range of operations, from straightforward loans to the provision of risk capital and guaranteeing foreign loans. They often have a very diversified clientele, often with special lines of credit or funds for each type of borrower, among which sometimes are found special operations for the development of local

technological capability -- a point to which we will return later on. In the larger countries some DBs have helped to spawn a network of local development banks, so as to ensure wider coverage of credits, and have helped such banks to operate.

The operations of DBs in LDCs are further characterized by the use of the project as an instrument of decision, i.e., a document stating the main economic, financial, technical, legal and administrative features of the venture to be supported. All DBs appraise the projects submitted to them at least from the point of view of their feasibility and success prospects. In most cases some of the wider consequences of the project, for instance its impact upon the balance of payments of the country or its consequences for other firms operating in the sector, are taken into account in the project appraisal, sometimes using "social account" prices ("shadow prices") to quantify such consequences. By the same token, most DBs have procedures to ensure that their funds are being used as projected and many have follow-up procedures after projects are completed.

The degree of autonomy DBs have for setting up their policies and project appraisal and control criteria varies from country to country and in many LDCs the DBs not only enjoy considerable autonomy but also play an important role in shaping the Governments' economic policies.

Therefore, the influence DBs exert upon the pattern of economic development goes beyond the provision of financing and often it is of a subtle nature, not explicitly declared,

as it is the case with their project appraisal criteria. Given the weight DBs' operations carry in the LDC's economies, the criteria used for appraising projects will play an important role in shaping such economies. Furthermore, in the measure such criteria are adopted for decision-making purposes by other Government agencies, entrepreneurs and other social units, their influence spreads throughout society.

Usually the appraisal of operations of the DBs in LDCs has praised the use of projects as an instrument of decision -- especially as a means for better resource allocation substituting for the "traditional" procedures based almost exclusively upon personal aspects of the clients. Nonetheless, there are good reasons to suppose that as regards technological development in LDCs, it is not only that some of the possibilities of using project appraisal as a means of fostering more and better local technological development have not been fully used, but also that in fact some criteria used have negative consequences for such development, as we shall see in the next section.

The issue of local technological capability is relatively new in the LDCs but its importance has grown immensely during the last decade. The arguments in favour of a greater local technological capability are well-known and it is beyond the scope of this Introduction to review them here (some of them are taken up briefly in the next section). The fact is that in most LDCs -- including those presenting this project -- Governments have taken up local technological development as a policy objective and have set up institutions and policy measures to pursue this objective.

Originally, science and technology policy in LDCs concentrated upon the development of a local scientific and technical capability, especially by providing additional resources to universities and research institutions for education and research. More recently, however, the experience of several countries, analysed in several research projects, such as those comprising the Science and Technology Policy Instruments Project, has shown that such an approach is insufficient -- that a "supply push" must be coupled with a "demand pull" under penalty of the resources developed laying idle.

Furthermore, research in LDCs has shown that often there is a contradiction between the explicit science and technology policy, with its objectives of increasing the degree of technological autonomy, and the policy implicit in the measures for industrial and agricultural development, such as, for instance, the imports controls or the credit policy of the Central Bank and of the Development Banks which tend to foster greater technological dependence. Such research has also shown that when there is a contradiction between the explicit and implicit technology policies, the latter usually dominates, frustrating the former's objectives.

Development Banks have usually played an important role in this process. In some countries they have become directly involved in the explicit technology policy, establishing, for instance, special funds for local technological development (1). However, their experience as promoters of greater local technological development has not yet been properly studied, even if the

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(1) Such as the FUNTEC-Fundo Tecnico Cientifico of the Banco Nacional de Desenvolvimento Economico-BNDE, in Brazil.

scant available evidence suggests that their performance in this area could be considerably improved. However, in all countries they are direct and important participants in the implicit policy, even if they often are unaware of its existence and importance, like the Bourgeois Gentilhomme, who spoke prose for forty years without knowing it. In fact, in many DBs the contradiction between the country's explicit and implicit science and technology policies is mirrored in their technological development operations and the criteria they use in their general operations, normally without the DBs being aware of such contradictions.

Therefore, given the role DBs play in LDCs, to achieve the objectives of greater technological autonomy it seems necessary that the DBs become actively involved in the promotion of local technological development not only through operations of direct support of scientific and technological activities but also through the criteria they use when appraising other types of activities, under the concept of an integrated and coherent technological policy.

It is to this triple task -- describing the DBs experience in the technology development field, in their normal operations and in their operations especially designed to promote technological development, assessing such experience and suggesting ways and means to improve it -- that this project is dedicated to.

III. Development Bank's Operations and Their Technological Consequences

A. General Operations

The general operations (GOs) of the Development Banks usually span over many sectors and involve several types of

operations (loans for fixed and working capital, equity participation, guarantees of foreign loans, etc.) and they have an important technological component in terms of source of product and process design origin of production techniques, type of factors of production used and ways of use, etc. In turn, such technological elements have important consequences in terms of the country's economic and social development in terms of technological autonomy, employment, use of national resources, etc.

However, the importance of the technological component of DB's "general operations" projects -- and of its consequences -- has received little recognition and much less research, despite the importance such projects play in the development of the economy and the fact that technological decisions may have a crucial role for the overall technological development of the country. Moreover, there is more than a nagging suspicion among technology policy-makers that the project criteria used by DBs in their general operations not only fail to fully exploit their potentiality as an instrument for fostering local technological development (see below) but often act completely against such development.

In fact, in most DBs, the criteria used for project appraisal put a premium on the use of well-known, reliable technologies, which in the case of the LDCs is usually tantamount to fostering the use of imported technologies. Clearly, in every country there is a range of products and processes for which the design and manufacturing techniques have to be imported under penalty of high social and private costs, including the outright failure of the project. Nonetheless, the scant evidence available suggests that most DBs take a rather "conservative" view of the

technology of the projects they appraise and eventually fund, failing to press for the use of locally-developed technology which would lead, over time, to a widening of the range of the products and processes designed and produced with local technology. Moreover, the evidence available suggests that project appraisals of technology in DBs seldom consider the consequences of the use of a proposed technology other than its entrepreneurial aspects of reliability and costs.

If DBs gave more consideration to the technological aspects of the projects they appraise, their effectiveness as development agencies could be considerably increased, as among the consequences of such change in criteria might be:

* Better and increased use of local labour by reinforcing the use of technologies adapted to the characteristics of local labour and relatively more labour intensive;

* Better and extended use of local natural resources through the adaptation of imported technology to local conditions and by developing technologies geared to local natural resources;

* Reduction of foreign exchange constraints by reduction of import expenditures via substitution of local for foreign technology, better bargaining conditions for imported technology and import substitution of finished products, as well as by increasing exports of goods and services;

* Reduction of environmental pollution by paying greater attention to the environmental consequences of the projects they fund;

• Reduction of labour accidents, a sad record in most LDCs, which could be improved if the DBs paid more attention to the consequences of the technology their projects use;

• Increase the general level of technological development. By putting a premium on the use of local technology the DBs will stimulate their clients -- be they enterprises, CEDOs or research institutes and universities -- to establish links between them, so that their policy may have a "multiplier effect", especially if they combine, as if in a package, "technological operations" and "general operations". Moreover, as it is known, the process of technological development is a collective process characterized by interactions between many social actors (enterprises, universities, CEDOs, etc.) which have a cumulative nature: where many actors are developing technology locally, others tend to do the same with an overall increase in efficiency -- and the same happens with the use of foreign technology. Furthermore, such a process is characterized by externalities accruing from the informal exchange of information and movements of personnel inter-institutionally. Therefore, the consequences of the DBs' actions extend beyond the enterprises and respective suppliers of technology inputs directly involved in the projects which DBs fund;

• Increasing national sovereignty, a prime objective of most Governments, which can be fulfilled by

the increase in the decisional capacity of locally-controlled institutions and in the competitive position of local enterprises. As in the process of technological development, this process is characterized by sinergy so that the consequences of DBs' policies are widespread.

Despite their importance, the DBs' criteria which rule project appraisal and follow-up have not be researched in light of technological development, nor have the consequences of such technological policy (albeit an unintended one). Insofar as DBs have been recognized as agents of technological development, the static choice of technology, especially between capital- and labour-intensive and small- and large-scale technologies, has been emphasized, and interest rate policies have been regarded as the main DBs' policy instrument.

Notwithstanding the importance of such aspects, the growing understanding of the importance of local technological development in LDCs and, especially, of the importance of an integrated policy, in which the explicit and implicit components coalesce for that purpose, put the emphasis upon the aspects of DBs' activities this project intends to study.

Although the DBs themselves are an important source of information, an appraisal of the technological consequences -- positive and negative -- of their "general operations" requires the analysis to be carried over to the level of their clients -- actual or potential -- in order to be able to assess the real influence the DBs' policies have on the decisions and economic and technological performance of such clients in comparison with other Government policies. By doing so, as will be seen later on in greater detail, this project hopes to contribute

not only to the technology policy making in the LDCs, but also to other policies too.

B. Technological Operations

Many Governments, all over the world, have set up financial mechanisms for supporting scientific and technological activities. Such resources are normally provided under special conditions, to foster local scientific and technological development. The incentives are varied -- ranging from low-cost loans (sometimes charged in effect a negative real interest rate and/or repaid only in case of success of the project) to straightforward grants; and they cover a wide variety of technological and scientific activities -- from research to quality control, according to countries and institutions. In the same way, the range of clients of the DBs varies considerably, but often it embraces most of the main participants in the process of technological development -- enterprises, consulting and engineering development organisations (CEDOs) and other suppliers of technical knowledge (especially research institutes and universities).

Sometimes Governments have set up special institutions to operate such incentives, as in the case of the NRDC in the U.K. and India, or they have confined their management to existing institutions with similar purposes, as in the cases of the funds involved in the actions concertées in France, or the funds run by Nacional Financiera in Mexico. Often several institutional forms of Governmental financial support to science and technology co-exist in the same country, as in the case of the U.K. and Brazil.

The allocation of public funds to the support of science and technology has raised a host of theoretical and policy problems which are far from being solved. There seems to be

some consensus that Government intervention is justifiable and needed at least at one end of the spectrum of scientific and technological activities -- research activities which by their nature involve long gestation periods before there is any economic result and which carry a high uncertainty whether there will be any "practical" result at all. In such cases, which cover most of the activities conducted by universities and part of the research activities of enterprises, there seems to be an agreement that the capital market will not provide funds for them so that unless the Government steps in, such activities will not be carried out.

There is, however, considerable controversy over the role of Government funding for projects of a more commercial nature, where the elements of high uncertainty and long maturation are less prominent. The discussion, in the advanced countries, has centered upon the imperfections of the capital market and the size of firms: some authors argue that the capital market will supply funds to innovative firms provided the projects and the firms show good prospects and that, therefore, the firms will take to the Government only their second-best projects, while other authors take a different view of the availability of funds in the capital market and argue that the firms will have to take to the Government the first-best projects, especially when the minimum scale of R&D expenditures is high in relation to the size of the firm.

The evidence presented by supporters of both views is contradictory and inconclusive (2) and appraisals of the results of the Government funding are few and equally inconclusive (3).

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(2) For the U.S. see, for example, Eads and Nelson (1971) Bean, et al (1975), respectively.

(3) See Walker (1975) for the U.K.'s NRDC, Pavitt ( ) and ( ) for the French policies, Braunlig, et al. (1976) for the FRG.

Furthermore, most of this controversy has been conducted in the industrialized countries, which have highly diversified capital markets and where the size of firms developed in accordance with their technological requirements. As it is known, conditions in LDCs are substantially different: there the imperfections of the capital market are much more pronounced and the size of firms (especially those of national private ownership) tends to be small, putting considerable strain on their self-financing capacity at a moment where local technological development has gained additional economic and political priority. Therefore, in such countries the case for Government support of scientific and technological activities, inclusive at the level of the enterprise, seems to be stronger.

However, although several LDCs have established mechanisms for financial support of scientific and technological activities which play a crucial role in their scientific and technological policies, there is a noticeable dearth of studies on this subject. Most often found are descriptions of the funding activities -- e.g., which sectors and types of institutions are funded, under which conditions, etc. -- and even those are often incomplete. Analyses of the criteria ruling such support and appraisals of its results are, in practice, almost inexistant -- a vacuum which the present project intends to fulfill, at least to some extent.

The importance for the Development Bank of such operations especially designed to promote scientific and technological development will very considerably, according to the clients of the institution. For some institutions, such as the MRDC

in the U.K. and India, and FINEP in Brazil, they are their raison d'être; but for the more general-purpose banks, such as the IDBI in India and BNDE in Brazil, such "technological operations" (TOs) are often a small part of the total operations of the bank, and play a minor role in its general strategy and participation in the Government policy-making procedures. Moreover, in many Banks it is probable that the "technological operations" are operated independently from the other operations. In such cases there is a great probability that the criteria which rule the latter were set with little consideration for their technological impact and that, given the usual criteria which are used for "general operations" in DBs, their consequences may be in contradiction with the objectives of the "technological operations", the one hand, so to speak, undoing what the other does. For this reason, this project puts a strong emphasis on the study of the complementarity of the two types of operations.

When different institutions are involved, the probability of contredictions is even greater and it is likely that the research will find several between DBs specializing in TOs and others doing GOs only. Other contradictions may arise between the DBs' policies and other Government policies; for instance, if the latter foster technological dependence (albeit unknowingly) or from contradictions between DBs' policies and enterprises with vested interests in the status quo. The extent and depth of such limits must be researched so that they can be better reduced by the DBs and other social actors involved. As for the case of general operations, such research will start from the DBs themselves, assessing the criteria used in TOs and the constraints they face, but will

also move to the clients' level to see what such criteria have meant in practice.

IV. National and International Results

In the previous section we have argued that although Development Banks are important instruments of a country's scientific and technological policy and that their action in this field may have far-reaching consequences, there is still very little scientific understanding of how they operate in this area, under which criteria and, especially, which are the consequences of their actions.

One of the main results of this project, at the level of each country participating in it, is the information provided to the DBs and to the Government about how the DBs operate, what are the consequences of such a way of operating and suggestions of how to improve their policies and procedures so as to increase their effectiveness as promoters of development. If correct and accepted, such suggestions would in the future have an impact on the clients of the DBs and, indirectly, on other social actors as well, either through the relationships they hold with the DBs' clients or through the influence DBs may have in shaping Government policies.

Probably to a different constituency the project will contribute knowledge about several issues of considerable economic and political relevance and which still suffer from considerable lack of theoretical elaboration and empirical knowledge. Among those are the relationship which exists in LDCs between the State, enterprises and the scientific and technological communities. At a different level, the project will shed some

light on the economics of technological change in LDCs, highlighting, for instance, the role financial incentives which reduce the cost of innovation may have in stimulating innovation, in comparison, for example, with other determinants of innovation, such as the pattern of competition and market structure.

The knowledge about issues such as those exemplified above will be of interest not only to social scientists and kindred fellows (hopefully including some policy-makers) of the country in question, but also to social scientists et allii of other countries as well.

The last point brings to the fore one of the main traits of the project — its international component, that it is a project of international co-operation, involving nine less-developed countries.

As it is well-known, in LDCs knowledge wears special blinders — people tend to know about their own countries and about the developed countries, but often ignore the conditions prevailing in other less-developed countries. This project will chip away at those blinders, establishing a co-operation between researchers of several countries and, indirectly (at least in the beginning) between policy-makers.

Both sets of people — researchers and policy-makers — stand to benefit from this co-operation. First and more generally there is the breaking of parochialism — cum-cultural dependence which contributes so much to the understanding of of local problems and to the generation of solutions for such problems by placing them in a worldwide framework.

More specifically, for the development bankers, as well as science and technology policy-makers and other Government institutions of countries at a similar stage of development (India, Mexico, Brazil) and which face some similar problems, both in terms of policies and operational procedures, there will be an important exchange of information which can lead to an improvement of their effectiveness. Besides such "horizontal transfer of technology", there will certainly be a "vertical transfer" from the more experienced Banks teaching the others through their successes and failures. Since the "comparative advantages" of each bank differ, it is hoped that the flow of information will not be uni-directional, from the DBs of the more developed countries to the less developed which participate in the project. Finally, such information may provide the basis for setting more direct relationships between the banks studied which may, in the future, lead to a co-operation between them in practical terms, strengthening the links between the respective countries.

For the researchers the project provides a unique opportunity for sharing experiences and information on theory, research methodology and, last but not least, facts about their own country and other LDCs. The result of such interaction will be not only better research in the present but also better research in the future.

Such results for policy-makers and researchers will be fully achieved only if research is conducted simultaneously in different countries within a general framework, as agreed by the participant teams. Such collective work through the es-

tablishment of a network of co-operating teams will generate learning affects and reciprocal stimuli which would not exist otherwise. In fact, from the point of view of the investment in research a collective process such as the one here proposed is, as it is known, the most cost-effective, in comparison with alternative approaches.

Of course, the results of the above-mentioned action depend heavily on the comparability of results, and the groups involved in the preparation of this proposal were fully aware of this condition and, as will be seen below, have taken the necessary steps to ensure such comparability.

V. Research Areas and Questions

This section details the main topics of research which the teams presenting the project have agreed upon and how they intend to study such issues.

Following the general framework established above, the teams have agreed that the bulk of the research should be conducted at two levels:

- At the level of the Development Banks, (1) studying the technological objectives, policies and operational procedures, and the technological consequences of their Technological Operations and of the General Operations; and (2) studying the relationship between such policies and other Government policies.

- At the level of the clients of the Banks, studying the reasons why they have approached the Banks and what the influence of the Banks was upon their technological and economic performance.

The results of this two-pronged approach will lead to the policy suggestions to the DBs and other Government institutions. In order to fit such results in the broader policy-making context of each country and, at the same time, provide information to the researchers and policy-makers of other countries, it was agreed that every national team's report should contain a background study containing such information.

In more detail, the three parts of the study would consist of the following:

A. Background Report

1. Description of the evolution of the country's explicit science and technology policy, with emphasis upon the financial component of such policy.

2. Description of the evolution of the national financial system and of the role the DBs to be studied play therein.

3. Description of the historical evolution of the DBs to be studied, covering points such as:

* reasons why the DBs were set up. Changes in objectives over time.

* summary of past operations, divided by sector, type of operation (IOs and types of GOs), type of clients (enterprises, CEDOs, universities and research institutes), conditions (interest rates, repayment and grace periods, etc.) of operations, etc.

4. Analysis of the relationships existing between the DBs and the Government and other national and international financial institutions, covering points such as:

* What is the degree of legal autonomy of the DB with respect to the Government policies?

* What is the influence of Government policies upon the TOs and upon the technological component of the DBs' GOs?

* What is the degree of complementarity and linkage between the DBs' TOs' objectives and implementation and other Government agencies operations (e.g. technology import controls)?

* What is the influence of international financial agencies and other foreign sources of funds upon the DBs' TOs and upon the technological component of GOs?

The study of the issues above will rely primarily on secondary material originated by Government agencies (e.g. Central Bank and DB Reports) and by social scientists (e.g. studies of the decision system within the State) but, especially for Part A.4., such material will have to be supplemented by primary research, mainly through interviews with Government and DB officers. The latter may, however, be included in the context of the interviews and case studies which will be required for other parts of the study.

B. Analysis at the Development Bank Level

1. Analysis of the objectives of the DBs as regards technological development, covering points such as:

* main stated objectives of the TOs (if they exist) and their priorities in terms of sectors, type of users (enterprisers, CEDOs,

etc.) and type of technological activity (R&D, quality control, imports of technology, etc.). Evolution over time of such objectives and priorities.

* main stated technological objectives of GOs and their priorities in terms of sectors, users and technological activities. Evolution over time of such objectives and priorities.

* comparison of TOs and GOs objectives and priorities with stated objectives and priorities of Government science and technology policy.

2. Analysis of the policies and practices actually put in practice by DBs, covering points such as:

* description of the types of TOs of the DBs (loans, risk capital, etc.) and their use, by type of user, technological activities, economic sector, etc. Evolution over time of such operations and of their conditions.

* analysis of criteria for appraising projects laid down in TOs' operational manuals. Technological capability (in-house and extra-muros) used for such appraisal.

* analysis of criteria used in appraising TOs projects via case studies of actual operations.

* analysis of feedback, monitoring and ex-post evolution mechanisms used for TOs operations. Changes introduced in TOs priorities and procedures as result of such mechanisms.

* analysis of the complementarity and linkage between TOs and GOs.

* analysis of how technology is treated in the operations manuals of GO.

* analysis of criteria used in practice for valuing technological elements in GOs via case studies. Technological capacity (in-house and extra-muros) used for such analysis.

* analysis of technological elements in feed-back monitoring and ex-post evaluation mechanisms in GOs and their consequences.

* comparison of GO and TO technology criteria with objectives and criteria of Government science and technology policy.

* analysis of the relationship between DB and Government agencies in charge of science and technology policy in the definition and implementation of TO and GO technology criteria, including feed-back from DB to Government agencies and its influence on the latter's operations.

* analysis of influence on GOs' and TOs' criteria of other Government agencies and international financial institutions.

As indicated above, part of such analysis (B.1.) will be based on official documents, such as the DBs' statements of policies and operation manuals, but the main part (B.2.) will come from interviews with Bank and other Government officers and from the analysis of case studies, complemented by the analysis at the users' level, detailed below.

C. Analysis at the Clients' Level

Most of the questions below are phrased for the study of enterprises since the teams of the project decided to focus especially on this type of DBs' clients. Nonetheless, most of the issues apply to other types of DBs' clients as well -- such as CEDOs and research institutes and universities.

1. General Technological Strategy of the Firm

• How do firms keep their technology up to date?

• How do firms identify technological opportunities and assess their technological needs, both current and projected?

• What attempts are the firms making to develop technology intra-muros ? For which purposes? How effective are they?

• What links has the firm established with other local sources of technology (CEDOs, research institutes, universities, etc.)? For which purposes? How effective are they? How were such sources identified? Does the firm absorb the knowledge supplied?

• To what extent are technological innovations crucial to the survival and growth of the firm? Where does the major impetus to innovation originate (regulation, user requirements, competition of other producers, etc.)?

• How do firms finance their technological activities?

• What impediments do firms face in obtaining financial assistence for their technological activities?

2. The Importance of the Projects Supported by the DBs for the Firm

• Description of the projects supported by DBs--purpose, technological activities involved, conditions (financial and otherwise) of support, whether it was part of a "package" of TO and GO, etc.

* How important are the projects supported by the DBs to the firms -- in terms of sales (local and exports), profits, growth and employment.

* How important is the project in terms of the firms' present and future technical capability.

3. The Role of the DB in the Projects they Finance

* What role did the DBs play in the technical aspects of the project at its various stages (conception, implementation)? Which type of interaction was there between the staff of the firm and that of the DBs?

* What role did the DBs play in the financial aspects of the project (share of funds, risk capital, etc.)? What role other sources of funds (the firm itself, commercial banks, other government agencies) play?

* What led the firm to contact the DBs for funds for the project (low interest rates, project is part of a larger project, initiative of CEDOs or other institutions, initiative of the DB, etc.)?

* If the DBs' funds had not been available, would the firm be able and willing to do it with its own funds? For which reasons?

* If the DBs' funds were not available, could the firm have obtained funds from other institutions? How do the DBs' funds compare with the other institutions?

* What differentiates the technology of the projects the firm funds with its own resources and/or with funds from other institutions from the technology of the projects presented to the DB?

* Has the firm had any project rejected by the DB or has it withdrawn a project accepted by the DB? How does the technology of such projects compare with that of the projects actually carried

The research in this area may be able to rely on written records, both of the DB (especially project files) and of the firm, but it will have to use mainly interviews with the entrepreneurs, managers and technical staff of the firms, counter-checked for good measure with officers of the DBs.

VI. Specific Countries' Emphases — International Comparability

All the teams participating in the project have agreed to focus upon the issues previously discussed. Nonetheless, different emphases arise at a more detailed level as regards, for instance, the type of operation of the DB (TO or GO) which will be analyzed in more detail in the sectors from where the sample of clients to be studied will be drawn. Such differences originate partly from the differences in the productive structure of the countries participating in the project but mainly from the experience of the DBs themselves, which, serving as a lynch-pin to the project, biases the choices of the researchers. Notwithstanding such unavoidable differences, the teams involved in

the project have made a great effort to unify their specific research topics so as to ensure comparability, which, as it will be seen below, seems guaranteed by the teams' final selection.

Given the mainly descriptive nature of the Background section (V.A. above), which poses no serious problems of comparability, we shall concentrate here on the two following parts of the study.

A. Analysis at the level of the DB

We have previously divided the DBs' operations into Technological Operations and General Operations. Although not all the DBs of the countries' teams perform both types of operation, as in the case of Peru, most teams will deal with both types of operation.

Table 1 below shows the main emphasis of the countries' teams in terms of the DBs' operations.

Table 1. — Analysis according to type of operation-country breakdown

Operation/Country	Arg.	Br.	Col.	In.	Mex.	Peru
GO Objectives	x	x*	x*	x	x	x*
GO Consequences	x	x*	x*	x	x	x*
TO Objectives	x*	x	x	x*	x*	-
TO Consequences	x*	x	x	x*	x*	-

x* — Main emphasis
x — Some study
- — No study at all

B. Analysis at the clients level

Several criteria, not mutually exclusive, have been agreed to classify the clients of the DBs:

1. Relationship with the DBs

* Users - institutions which have actually received funds from the DBs.

* Rejected - institutions which have applied for funds but whose projects the DBs refused.

* Quitters - institutions which have applied for DB funds but then withdrew their application.

* Non-applicants - institutions with similar characteristics of "users" which did not apply for funds.

Although the teams will concentrate on the first set of clients, the others provide a very useful control group for our research purposes. Moreover, a firm may have projects in all types of categories.

2. Type of operation: TO and/or GO.

3. Type of user:

* Productive units - enterprises, mainly industrial.

* CEDOs

* R&D Suppliers - technological research institutes, universities, independent laboratories, etc.

4. Sector of activity -- especially for productive units, initially disaggregated at two-digit level.

5. Others -- Ownership (Public, Private National, Private Foreign, Mixed), Size of Firm, Pattern of Competition, etc.

As can be seen from Table 2., the several countries' studies will have a comparability which ensures the learning effects previously discussed. Such comparability and learning will be further ensured by periodic meetings of the country teams' co-ordinators and by exchange of information between teams on an

informal basis, hopefully complemented by exchange of technical personnel among teams. Such modalities of transfer of knowledge while the research is on-going will allow the teams to keep abreast of the progress of the study in other countries and benefit from their results in time to incorporate them into their own work.

At the end of the work at the national level, the coordinators will meet and design procedures to produce a comparative analysis which would follow, roughly, the framework here presented, highlighting the differences and similarities found between the countries reports as well as the policy suggestions which can be derived from there. In such comparative report emphasis will be given to the results which can be applied to other countries as well.

Table 2. — Analysis according to DB's clients — Country Breakdown

Criteria/Country	Ar.	Br.	Col.	In.	Mex.	Peru
Rel. w/DB	Users	Users* Quitters	Users* N.appl.	Users* N.appl	Users	Users
Type of oper.	TO* GO	TO GO*	TO* CO*	TO* GO	TO* GO	-- GO
Type of user	Prod.U.* R&D S.	Prod.U.	Prod.U.* R&D S.	Prod. U.* CEDCs*	Prod. U.* R&D S.	Prod. U.
Sector	Agriculture Machinery Food. Proc.	Metal. Mach. Electrical	Food Mach. Chem.	Metal. Mach. Chem. Paper Cottage Rural	Food Mach. Chem.	Metal. Mach. Food Paper
Others	Ownership Tech. stage	Ownership Size of Ent. & Loan Pattern of Competition	Ownership Size of Ent. Pattern of finance	Ownership Size of Ent.	Ownership Size of Ent.	New or old project Pattern of Finance

Note: A (*) indicates main emphasis.

Research begets research and in this case several possible extensions can be suggested. In the countries participating in the project several issues will remain less studied than it is desirable as a result of time, personnel and budgetary constraints (e.g., the relationship between Government and DBs). Such issues could — and ought to — be taken up again in the future, either by the same teams or by others (including the DBs research departments). For other countries the approach, procedures and results of the project may serve as an example for research in the same or related areas, in the same way as the mistakes made (inevitable, but hopefully small) will serve as a guide of pitfalls to be avoided. The final comparative report, based on the countries' experience, will signal such research areas, with the hope that the project may indeed play a seminal role.

VII. Timetable

The research is expected to last approximately 18 to 24 months at the national level, and the final comparative report is expected to be available 6 months after the national teams have finished their work.

TIMETABLE

I. NATIONAL LEVEL

A. Background

B. Analysis at DB level
- Preparation
- Analysis of TOs
- Analysis of GOs

C. Analysis of Clients
- Sample selection
- Preparation of Quest.
- Application of Quest.

D. Final Report

II. INTERNATIONAL LEVEL

A. First Coordination Meeting

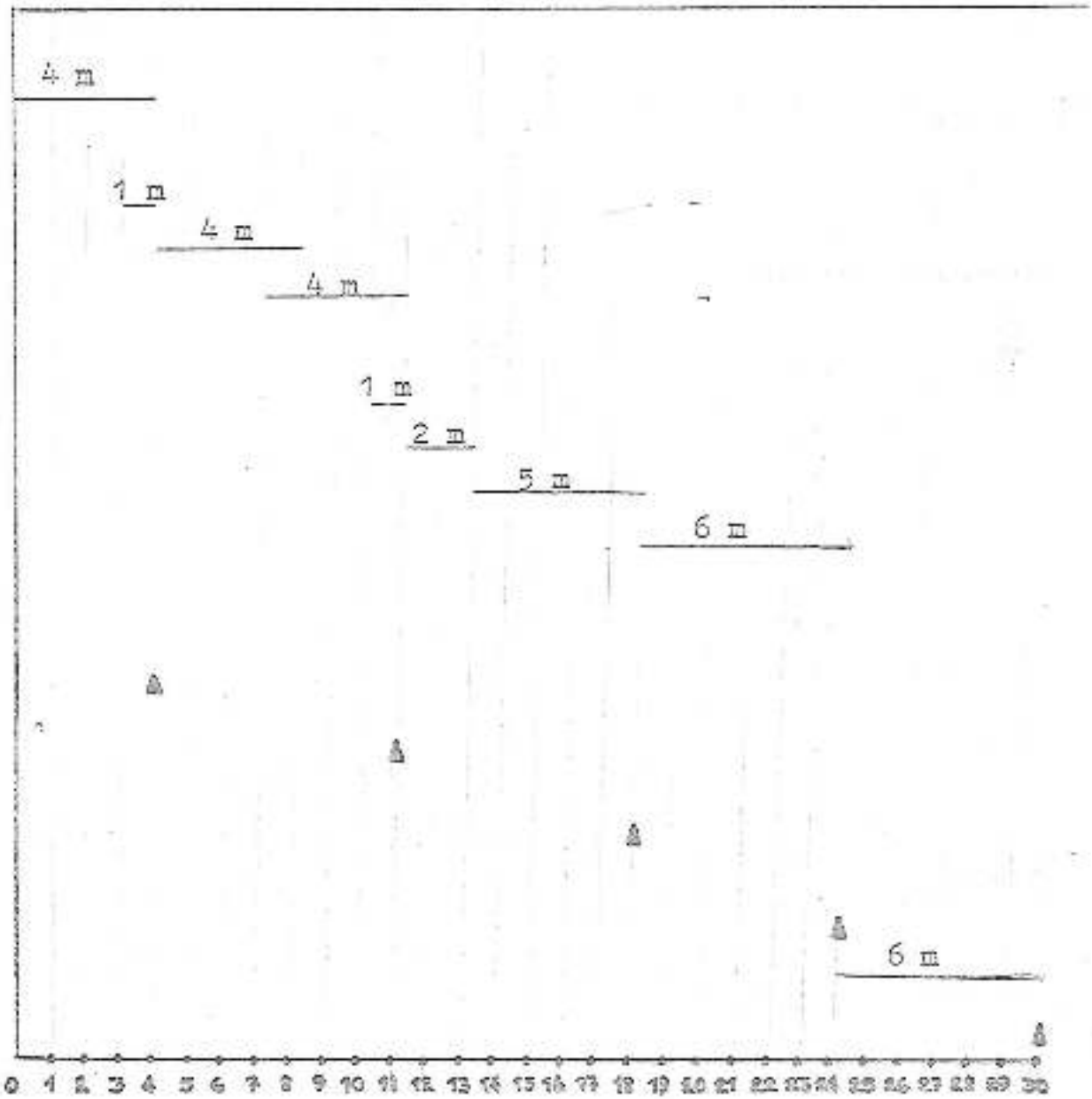
B. Second Coordination Meeting

C. Third Coordination Meeting

D. Final Coordination Meeting

E. Comparative Report

F. Appraisal Meeting



BUDGET

	Arg.	B.	Col.	I.	M.	P.
A. Expenditures						
1. Personnel						
* Coordination						
* Senior Researchers						
* Junior Researchers						
* Administrative						
2. Travel						
* International						
* National						
3. Others (copying, mailing, etc.						
4. Contingency Fund						
TOTAL						
B. Sources						
1. National						
* Research Institution						
* Other						
2. International						
* OAS						
* OECD						
* IRDC						
* WB						
TOTAL						