

SCIENCE AND TECHNOLOGY PROGRAM

(BR-0164)

EXECUTIVE SUMMARY

BORROWER: The Federative Republic of Brazil

EXECUTING AGENCY: Financiadora de Estudos e Projetos [Agency for the Financing of Studies and Projects] (FINEP)

AMOUNT AND SOURCE: IDB: US\$160 million (OC)
Local counterpart funding: US\$160 million
Total: US\$320 million

FINANCIAL TERMS AND CONDITIONS: Amortization period: 20 years
Disbursement period: 4 years
Interest rate: variable
Inspection and supervision: 1%
Credit fee: 0.75%

OBJECTIVES: The purpose of the program is to help develop and improve Brazil's scientific and technological capabilities and to increase corporate competitive skills and productivity by modernizing the technology they use.

DESCRIPTION: The program consists of the following two subprograms: (a) a subprogram to support the development and technological upgrading of local businesses. Seventy percent of the program funds would be used to grant reimbursable financing to private companies for technological modernization; and (b) a scientific and technological development subprogram that would be assigned 30 percent of the program resources for the financing - by means of nonreimbursable transfers - of research and development projects submitted by universities as well as public and private nonprofit research institutions.

ENVIRONMENTAL CLASSIFICATION: The Environment Committee classified this as a Category II operation at its September 20, 1994, meeting.

IMPACT ON POVERTY: The program is specifically designed to improve the national capability for the development, assimilation, adaptation and harnessing of science and technology. As a result, the operation is not subject to criteria which would permit it to be

geared to any given social sector or aimed directly at poverty reduction, as established in the report on the Eighth Replenishment of the Bank's Resources.

BENEFITS:

The operation will heighten the country's ability to: (a) modernize its privately owned companies in order to boost their productivity and competitive skills in world markets, thus improving Brazil's balance of payments position; (b) carry out scientific and technological research and use the results thereof for economic and social development purposes; (c) assimilate and adapt science and technology originating in other countries; (d) foster cooperation between academic institutions and the productive sector of the economy; (e) retain professionals who are specially trained for scientific and technological work; and (f) consolidate the financial and administrative situation of the principal agency that promotes and nurtures technological innovation in Brazil.

RISKS:

The program's main risk will be FINEP's initial use of commercial banks as financial intermediaries. Thus far, FINEP's experience - which is limited - has been confined to state-owned banks. It has not yet been demonstrated that the private banking sector can accommodate the clientele of small and medium-sized enterprises for science and technology projects, nor have the proposed mechanisms for technical evaluation of those projects been tested to ensure attainment of the sector objectives.

To lessen those risks, it is proposed that, prior to the first disbursement, FINEP present for the Bank's approval model contracts which it would sign with the financial intermediaries as well as possible agreements with the agencies that are to conduct the technical evaluations. In addition, two intermediate evaluations would be performed to assess this and other aspects of the program and make any adjustments that might be necessary therein. The first monitoring mission would take place 12 months after the effective date of the loan contract.

**THE BANK'S
COUNTRY AND
SECTOR STRATEGY:**

The program is consistent with the Bank's strategy in Brazil, which calls for support for the country's scientific and technological development and upgrading of the requisite social and physical infrastructure for the productive sectors to continue competing in world markets.

**SPECIAL
CONTRACTUAL
CONDITIONS:**

Prior to the first disbursement: (a) the borrower is to present evidence that the program resources have been transferred to FINEP subject to the stated terms and conditions (see paragraph 3.1); (b) FINEP is to have put into effect the Operating Regulations (see paragraph 3.2) and adopted the evaluation and efficiency indicators agreed upon with the Bank (see paragraph 3.32); and (c) model contracts for the financial intermediaries and agreements with the class associations (see paragraph 5.14) are to be submitted.

Other special contractual conditions:

- a. Program impact and evaluation: Starting at the close of the first year of program execution, and at the end of each year thereafter, the executing agency is to present annual reports describing the progress made in executing each of the components and the status of compliance with each of the contemplated annual goals (see paragraph 3.32);
- b. Review and monitoring of the program: Two intermediate evaluations of the program will be conducted to determine attainment of the program objectives and the results obtained from the project financing provided. The first evaluation is to be done 12 months from the date the contract enters into effect, followed by a second one 30 months from that same date (see paragraph 3.31);
- c. Program administrative efficiency indicators: Throughout the program execution period, starting 12 months from the date the loan contract enters into effect and annually thereafter, the Bank and FINEP will verify compliance with the program administrative efficiency indicators (see paragraph 4.27);
- d. Limits on the procurement of goods and services: the ceiling amounts that will be set on procurement under this project by means of international public bidding are: US\$350,000 for goods and US\$5 million for civil works (see paragraph 3.24);
- e. Financial intermediation: of the funds under subprogram A (ADTEN/AGQ), 25% is to be channelled through commercial banks (see paragraph 3.9); and

- f. Management information system: FINEP is to demonstrate, within 12 months after the effective date of the loan contract, that the management information system has been implemented (see paragraph 4.6).

I. FRAME OF REFERENCE

A. Introduction

- 1.1 The importance of research and development as a catalyst for technological change in the private sector is recognized in theory although not equally in practice. Important economic gains can result from institutions and private industry in research and development, but since these returns are not often fully captured by the private sector, there is a role for support and encouragement from the State, through public subsidies. Underinvestment in research and development by the private sector might occur when research results enter the public domain, taking on the characteristics of public goods. Moreover, the high risk and lengthy gestation period for many research projects precludes access to commercial credit. The State therefore must address these constraints as they bear directly on the nation's growth.
- 1.2 With the advent of increasingly globalized and competitive markets, a country's comparative advantage is perhaps now more a function of its scientific and technological capacity than of its natural endowments or sources of low-cost labor. Scientific and technological expertise is needed to be able to either 1) apply imported technology, which may or may not need to be adapted to local conditions before it can be applied, or 2) create new production and new production processes. The greater the diversification and level of competence of a nation's specialists in science and technology, coupled with the availability of resources, the greater the technical capacity. Science and technology, therefore, is a vital instrument for global competitiveness through which economic growth and social transformation can occur.
- 1.3 The Brazilian experience in the field of science and technology is no different. Beginning in 1990, opening the economy of Brazil to international competition, became a national policy objective. This policy has been maintained by the new government, which likewise views the modernization of the nation's productive sectors as essential for Brazil's successful insertion into the increasingly competitive global economy and because greater reliance upon market forces will inhibit the ease with which domestic producers have traditionally raised prices and perpetuated inflationary expectations. The government is continuing to pursue these objectives through four major fronts: (a) tariff reductions and expanded participation in MERCOSUR and the TRIPS/GATT agreements; (b) programs to do away with regulatory and structural distortions; (c) upgrade firms' manufacturing and management standards; and (d) systematic efforts to lower domestic costs that impact export competitiveness and/or increase the costs of imports. This proposed program for science and technology will support this government policy, and help achieve its objectives.

B. Emerging macroeconomic trends

- 1.4 Nearly five years after the first of many economic stabilization and structural adjustment programs, Brazil has witnessed considerable change. Once plagued with soaring inflation rates, huge public sector deficits, and heavily protectionist trade policies, Brazil has made sound progress in liberalizing its trade regime, reducing its debt burden, and downsizing the role of the public sector in productive activity. Finally, and perhaps most encouraging, the Brazilian Government has managed to reduce inflation from 50% a month last June to less than 2% by mid-April - the lowest monthly rate in over a decade, since launching the "Plano Real" in December of 1993.
- 1.5 Yet the more recent efforts to correct relative prices have had some deleterious effects in other areas of the economy. Within months after its introduction, the "real" had appreciated to such a level that the central bank began buying dollars to keep it from appreciating beyond the level US\$1.00 = R\$0.99. While keeping a brake on inflationary pressures, these measures weakened the competitiveness of Brazil's manufactured exports and unleashed strong demand pressures which then led the authorities to raise the compulsory reserve requirements in the banking system - a measure which pushed annualized interest rates to over 35% in real terms by October of 1994. At such levels, borrowing for new investment, for example that investment which is needed for industrial modernization, is unlikely. Indeed, long-term credit from commercial banks is virtually nonexistent, which in turn, impedes private sector technological development.
- 1.6 Prior to the Plano Real, loan pricing was based on the "Taxa de Referencia" which was essentially a monetary correction for short term market rates. Yet with such high inflation, there was no affordable long term financing available. Not surprisingly, investments, particularly those considered high risk and/or those whose gestation period was long term, fell considerably. Therefore, in order to provide a reference for long term market interest rates, the Long Term Interest Rate (TJLP) was established in October 1994, to stimulate long term investment. The rate is calculated as an average of these two yields with the relative weights: external debt (70%) and internal (30%). This rate reflects the cost of long-term funds to the Government of Brazil and is reviewed quarterly to adjust for inflation. For the period June 1 through August 1, 1995, the TJLP was fixed at 24.75%. A more detailed explanation on the interest rate structure is discussed in paragraphs 4.16 and 4.17 of the proposal. This rate, which is based on the yield generated by long term internal and external debt bonds issued by the country, and by law (Resolution 2.121), must be used by all official agencies for long term financing.

C. Modernization of Brazilian industry

- 1.7 In the early 1990s, a large part of Brazilian industry operated with outdated equipment and installations, deficiencies in process technologies, obsolete modalities, delays in developing product technologies with relatively little investment in R&D and little dissemination of total quality management (TQM) practices. Yet when faced with a growing threat from imports after trade liberalization and tariff reduction, Brazilian firms responded by undertaking the most drastic restructuring since the onset of industrialization. Underlying the ability of firms to face the challenge of growing imports were first and foremost, a commitment to restructure and modernize the firms' operations through the introduction of cost-reducing and quality-enhancing programs. Once motivated by the import substitution model, Brazil's industrial policy is now geared towards modernization for increased competitiveness in the global economy.
- 1.8 The industrial sector plays a vital role in the Brazilian economy, accounting for over a third of GDP since 1989. With a growth rate of 7%, industrial production reached its highest level in the last five years, accounting for most of the 5.7% growth rate recorded last year. Not surprisingly, manufacturing represented by far the major share of growth within industry. Strong subsectors include chemicals, metallurgical, and mechanics (all of which have benefitted from R&D financing from FINEP) with the strongest gains being registered in the automobile industry. In the period 1991-1994, industrial labor productivity grew over 36%, with electric machinery (including telecommunications), beverages, non-electric machinery, and mining all showing growth rates well above 15%.
- 1.9 To a significant degree, the productivity and quality gains observed in the last few years came as a result of producer commitment to total quality management - expressed in their adherence to international total quality standards, as codified in the International Standards Organization (ISO) 9000 series. ^{1/} In Brazil, the ISO is represented by the Brazilian Association of Technical Standards (ABNT). Compliance with these standards has become a major goal for industrial firms, both for internal productivity and quality-related reasons, and as an effective marketing device to promote their products in both domestic and external markets as internationally recognized for quality.

^{1/} In 1991, 18 firms were certified; in 1994, that number rose to 410 and it is expected that by 1997, 5,500 firms will be certified as meeting ISO-9000 series. (Confederação Nacional da Indústria, December 1994, No.286, p.10)

TABLE I-1
ISO-9000 Series Certified Firms
(as of October 1994)

Country	Number of firms
Argentina	17
Colombia	25
Mexico	133
Brazil a/	410
Denmark	600
Italy	1500
Canada	1500
France	2480
U.S.	4500
Source: GOB, Instituto Nacional de Metrologia. a/ A total of 850 firms are expected to be certified within 18 months.	

- 1.10 There is little question that the quality and productivity gains observed in Brazilian industry have been both motivated by, and instrumental in, allowing producers to compete effectively in export markets. In fact, 44% of ISO-9000 firms recently (October 1994) surveyed by the National Confederation of Industry mentioned that their engagement in the certification process was a result of their quest to become internationally competitive.
- 1.11 The improvement of producers' competitive standing has been reflected in Brazilian exports. After declining in the 1988-1990 period from US\$33.8 billion to US\$31.4 billion, exports have expanded at an average annual rate of 8.5% (1990-1994), reaching US\$44.3 billion in 1994. How much of this is owed, directly or indirectly, to the adoption of TQM and ISO standards is, of course, difficult to determine. Nevertheless, there is a strong correlation between the firms certified by international standards and growth in exports in the sectors during the 1990-1993 period; nearly 40% of ISO-classified firms were registered in metal-mechanics - a sector whose exports grew by 51%. Exports in the electronics sector, which had 27% of the ISO firms, grew by 33%. Continued modernization of the Brazilian industry is a priority for the Brazilian government and Financiadora de Estudos e Projetos (FINEP) is one of its important vehicles for achieving it.
- 1.12 As a member of MERCOSUR, Brazil is well positioned to benefit from, as well as contribute to, the economic development of the region. As of January 1 of this year, the region's common external tariff varies from zero to a maximum of 20%, yet there are some exemptions. For capital goods, for instance, each country will have its own tariff rates, converging linearly and automatically to reach 14% in 2001. Of particular importance to Brazil, the sole producer of technology information goods such as microcomputers, is

the reduction of their import tariff rates to 16% in 2006, which are currently as high as 40%. Therefore, with the advent of further trade liberalization, the ability to compete, both within and outside the region, is becoming increasingly important.

- 1.13 Another area of particular relevance to this program deals with Brazil's treatment of intellectual property rights. Beginning with the Paris accords of 1884 on industrial property rights, through the more recent GATT agreements, especially the TRIPS amendment, ratified by Brazil on November of 1992, Brazil has been very active in participating in the preparation and promotion of international agreements in this field. ^{2/} In that regard, national legislation has been compatible with the commitments that the country has made at the international level. The present legislation for intellectual property rights would need only minor modifications to adhere to the recent TRIPS/GATT accords. Although the Brazilian Government has up to 10 years to comply with these accords, it has already presented to Congress more far-reaching legislation pertaining to intellectual property rights in order to modernize their systems.
- 1.14 Said legislation, which commands full support from Brazil's President, is expected to pass the Senate this year, and then must be considered by the House. The principal components of this proposal deal with (i) products and processes which would be considered patentable which under current legislation (Law 5772/5771) are not patentable (chemical and food products, pharmaceutical products and processes); (ii) microorganisms and biotech products; (iii) compulsory licensing; (iv) retroactive patenting; (v) extended protection periods, and (vi) shorter transition periods. Nevertheless, there is still a risk that opposing sides to the debate, namely, those in the Brazilian Congress whose constituency represents either the large multinationals or local pharmaceuticals, cannot reach a timely agreement. Even if it takes longer than anticipated for this legislation to pass Congress, the implementation of the proposed program is justified by its positive impact on the development of the science and technology sector and the fact that it would be executed within the context of prevailing international agreements on intellectual property.

^{2/} During the preparation of this program, the Bank contracted a study which will specifically identify any factor which may affect the design, execution and impact of the program, and will include an analysis of current and pending IPR legislation, including enforcement practices. The study will also examine potential areas of violations and/or compatibility with GATT or other international treaties regarding intellectual property rights. Preliminary results of this study are imminent.

1.15 FINEP is a public enterprise dedicated to the development of science and technology in the country, and finances projects for universities and institutions, as well as private companies. It has no attributes to influence or propose legislation relating to intellectual property rights. In the case of research projects financed through grants to the universities and non-profit institutions, the property rights to the products that are produced or discovered, are shared equally between the institution and FINEP, as well as the licensing of said product. When FINEP finances private companies, the intellectual property rights of the product are, by law, property of the company.

1.16 As Brazil continues to open up its economy and compete in the global marketplace, its compliance with these international accords will be closely monitored, particularly by its competitors. Clearly, any measure in violation of these agreements could result in retaliatory actions which a developing country can ill afford.

D. Science and technology: a vital input to industry

1.17 Although total quality management has afforded Brazilian industry a major competitive leap, it was done in large measure with relatively low investment levels and outdated processes, and without a major effort at product innovation and differentiation. As international competition intensifies, and total quality practices become widely disseminated, the sustainability of industrial growth will depend increasingly on firms adding value through design and innovation, and by incorporating new vintages of capital goods. While both the intensity of R&D efforts by the productive sectors and the rate of embodied technical progress have been slowly increasing, they remain incipient. Furthermore, given the macroeconomic climate mentioned above, substantial investment solely by the private sector in the near to medium term is unlikely.

1.18 Yet in order for Brazil to continue to grow at rates similar to those of the last several years, the country must not only raise its overall investment rate, but continue to introduce technological advances in the production processes to make that investment more productive and competitive. It is precisely this objective which forms the basis for Brazilian policy in science and technology.

1. Brazilian policy for science and technology

1.19 In direct support of its development strategy (as outlined in paragraph 1.11), the Brazilian government has articulated several policy objectives which influence science and technology:

- Promote partnerships between the federal and state governments and the productive sector through specific programs of basic

research and technology and projects of human resource development.

- Create mechanisms which stimulate and facilitate the development of projects of scientific and technological cooperation among universities, government institutions and the private sector.
- Provide the necessary conditions required to retain high level researchers, while requiring a complete review of the actual post graduate system - improving the quality, efficiency and applicability towards the labor market.
- Support competitive technology through incentives, financing, participation in risk capital, shared risk funds, funds for the formation of specialized human capital, and special financing for the creation of private sector research and development firms.
- Support small and microenterprises enterprises of the country in the development of new products and processes.

2. Institutional framework for science and technology

- 1.20 As in any country, the key actors in science and technology are 1) the suppliers of S&T, that is, research centers, universities, and of course, the scientists themselves, 2) the buyers of S&T, that is, the productive sector, firms and businesses, and 3) those institutions which facilitate S&T, by formulating policy, promoting S&T development, and perhaps most important, the financing of S&T, particularly in instances where no alternative financing is available.
- 1.21 In industrialized countries like Japan, Germany and the United States, as well as the newly industrializing countries such as Taiwan and South Korea, the federal government has played a crucial role in determining strategic areas for research and development and mobilizing resources (including at subsidized rates) for those activities where private returns do not fully reflect the externalities generated. In this regard, Brazil is no different. In the following paragraphs, the Brazilian science and technology system is described briefly.
- 1.22 Sectoral policy is formulated by the Ministry of Science and Technology (MST) in conjunction with the sectoral ministries, in particular the Ministries of Education, Health, Agriculture and Mining and Energy. The MST also chairs the Coordination Committee (Conselho Nacional de Ciência e Tecnologia or CCT/MST) which is composed of the various actors who have the basic responsibility of promoting and financing scientific and technological development at the national level: (i) Conselho Nacional para o Desenvolvimento Científico e Tecnológico (CNPq) responsible for providing

scholarships and grants for research, including post-graduate work in foreign universities; (ii) Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) under the Ministry of Education which primarily supports post-graduate studies (at the Masters and PhD levels); and (iii) the FINEP.

- 1.23 FINEP is the Executive Secretariat of the FNDCT, Fundo Nacional de Desenvolvimento Científico e Tecnológico, principal source of resources of the sector which supports research, as well as technological development.
- 1.24 Finally, the Banco Nacional de Desenvolvimento Econômico e Social (BNDES), while not specifically mandated, also finances some aspects of scientific and technological advancement in the private sector, such as capital for industrial modernization. In addition, there are many initiatives at the state level in science and technology - the most advanced being located primarily in the southeastern states of Brazil.

3. Constraints to growth: science and technology at risk 3/

- 1.25 Despite the major competitive strides observed in Brazilian industry in the post-1990 period, there are three critically weak areas which may threaten the long term sustainability of this process of quality and productivity gains: (i) the low level of education of Brazilian workers (and of in-house training expenditures), many still lacking the fundamental cognitive skills required for competitive production; (ii) the structural weaknesses of small and medium enterprises, which function as impediments to their modernization; and (iii) the still incipient product differentiation and innovation efforts (as reflected in low R&D expenditures).
- 1.26 This last item, in turn, can be attributed to two key factors: (a) weak linkages between research centers and the productive sector and (b) limited financing available for research and development.

a. Weak linkages: research centers and the productive sector

- 1.27 Without due consideration to the applicability of any research activity, the usefulness of said research is undermined as its results are simply shelved. Indeed, research which is oriented to productive sector needs has a greater potential for being applied to address society's needs. Unfortunately, the Brazilian system of

3/ This section draws on the results of several studies financed by the GOB with support from both the Bank and the World Bank: "Estudios Analíticos del Sector de Ciencia y Tecnología en Brasil"; "Estudio de Competitividad de la Industria Brasileña" and "Estado Actual y Papel Futuro de la Ciencia y la Tecnología en Brasil".

science and technology is only now beginning to forge solid ties with the productive sector, and through resources of this program that effort will be strengthened.

b. Financing research and development: availability & composition

- 1.28 Historically, investment in R&D in Brazil has been well below international standards, accounting for just 0.6% of GDP in 1994 as compared to a range 1.5-3% of GDP in industrialized and fast-industrializing countries. ^{4/} In Brazil, science and technology became explicit budgetary items only as late as 1969 within the First National Development Plan. ^{5/} The overall low levels of investment are financed almost exclusively through public sector. Indeed, the dominant role the public sector has played in both financing and execution of R&D activities has become a growing concern, in particular, given the fiscal constraints faced by the country.
- 1.29 The private sector share of science and technology ranges from 10 to 20% in Brazil, while in OECD countries, the private sector is responsible for generally above 40%, and can reach well over 50% in the case of Japan. The lack of long term credit acts as a strong disincentive for private sector investment. Resources from the proposed Program would assist the Government in addressing these financial constraints.

E. Role of FINEP: meeting the challenges

- 1.30 FINEP's central mission is to promote national scientific and technological development through financing specific projects proposed by businesses or research or development institutions. (See Chapter IV for a detailed description of FINEP.) FINEP performs a unique, catalytic function, providing financing for both productive sector and research institutions, bringing together firms, in need of technological advancement, and research institutions, who can provide the required innovation.
- 1.31 As the private sector becomes increasingly engaged in innovation and venture capital finance, FINEP's role will focus on promoting effective partnerships between public S&T institutions and private economic agents. This program will give preference in awarding grant monies to research institutions which are actively involved with the productive sector. Additionally, FINEP will continue to coordinate efforts of public and private agents engaged in

^{4/} C. Frischtak "Brazil - Science and Technology", report prepared for the Inter-American Development Bank, November 1994.

^{5/} Sergio Trindade in "Technology Development in Developing Countries: The Case of private R&D Institutions in Brazil, R&D Management 10,2, 1980, pp. 77-82.

technology development, and facilitate the exchange of information from these agents, while continuing to play an important role in managing financial flows to basic research activities and to highly risky applied research and development which manifest important externalities.

- 1.32 Given the private sector's slow response to changes in their R&D behavior, and in light of current economic constraints, academia, and particularly the federal universities, will continue to take the lead in new areas for research and development. Public support in high-technology sectors is justified on the basis of evidence suggesting that individual firms cannot always achieve economies of scale and risk averaging in R&D activities that joint efforts and outside funding can allow. Therefore, FINEP's mandate will continue to be valid, and governmental support, via FINEP, for research infrastructure will still be needed over the short to medium term.

1. Strategic areas: FINEP as agent of change

- 1.33 In order to implement its sectoral policy, the Brazilian Government has articulated several strategic areas in the S&T sector which should be given high priority and which FINEP, as a government agency, and the Bank, through the proposed Program, reinforces:

a. Technological development

- 1.34 FINEP's key activity will remain in technological development both in product and process. In particular, FINEP seeks to promote technology development while establishing links between universities, or research centers and the productive sector. When evaluating a research proposal, weight is given to how readily the results can be applied; as well as if a firm is involved in some component of the research project to be undertaken. Moreover, FINEP-TEC (Programa de Apoio a Parceria Tecnologica Universidades - Empresa) which is a fiscal incentives program aimed at promoting partnerships between universities and private sector by offering tax credits for private investment in R&D. Research in Biosciences, Physics and Chemistry will still be considered priority areas as these three disciplines form the basis for the development of advanced technology.
- 1.35 Another priority area within the field of technological development relates to Engineering - establishing a solid technological base required to continue to make gains in quality and competitiveness. As engineering involves the transformation and application of scientific knowledge into useful goods and services, FINEP's support in this area is central, therefore to the dissemination of said knowledge.

b. Social development

- 1.36 As stated in a recent diagnostic of Brazilian industry 6/, it is "necessary to recognize and emphasize that competitive development will not be attainable as long as large segments of the population are excluded and survive on marginal activities..." This mandate has been validated by the current Administration which has afforded high priority on resolving the many social issues facing Brazil. In that regard, this priority has been operationalized through FINEP's support of applied research in the areas of education, health, nutrition, hunger and violence, social integration, and environmental conservation, and will be one of the new areas that will be eligible for financing in this Program. FINEP not only promotes competitiveness which may lead to stronger growth, but also is concerned with how that growth is shared.

c. Small & medium enterprise

- 1.37 The importance of small and medium-sized enterprise (SME) to industrial competitiveness should not be underestimated. The development of an advanced subcontracting base, a characteristic of a number of successful major industries (automotive, electronics), is predicated on the presence of a network of competent producers of smaller size, committed however to the same standards as their clients. Secondly, SMEs are major providers of products and services which do not serve as direct inputs into manufacturing processes, but tend to be of major importance in the consumption basket of workers. Thus, they ultimately affect firms' competitive standing. Such goods and services are often non-tradables, so that the pressure from international competition to improve production conditions and managerial behavior is weak, or even non-existent. Due to the importance of supporting this sector, it has been proposed, as a target, that a minimum of 30% (US\$67.2 million) of the subprogram resources directed to private enterprises, be channeled to the SME's, which are defined as those firms which have up to 500 employees.
- 1.38 Over the last twelve years, based on a framework agreement with Serviço Brasileiro de Apoio às Micro e Pequenas Empresas (SEBRAE), FINEP has financed initiatives of the small and micro enterprise sector through the creation of the Programa de Apoio Tecnológico às Micro e Pequenas Empresas (PATME). PATME primarily finances product and process improvement through consultancies which, through 1994, amounted to 577 projects with 2,518 firms at a value of slightly over US\$900,000. More recently through the ADTEN credit line, and implemented by regional public/private banks, FINEP has financed 46 projects in 1993/1994 for a total value of US\$4.1 million. In particular, FINEP's support was critical in

6/ Luciana Coutinho and João Carlos Ferraz, Estudo da Competitividade da Indústria Brasileira, Campinas, Editora Da UNICAMP, 1994.

helping the information technology industry expand so rapidly during the 1980s (and remains so today). While allowing for a greater geographic dispersion through decentralized operations via both public and private banks, FINEP is well positioned to dramatically increase its client base. Not only will FINEP provide resources to a sector which finds difficulty in accessing the commercial banking system, it will also help address regional inequities of its own operations. Furthermore, given the government's priority of job creation at a time when both private firms and the public sector are downsizing, the ability to absorb new employment by this sector will be increasingly vital.

F. Previous Bank operations in science and technology

- 1.39 FINEP has received Bank financing since 1965. A total of eleven loans have been granted, five for preinvestment, for a total of US\$83.9 million and six for the development of science and technology, for a total of US\$212.0 million. The most recent of these operations was loan 620/OC-BR, which was approved on March 28, 1991 for US\$100.0 million. The program's resources for this operation have been totally disbursed and the objectives have been achieved in a satisfactory manner. The most recent of these operations was loan 620/OC-BR, which was approved on March 28, 1991 for US\$100.0 million. The program's resources for this operation have been totally disbursed and the objectives have been achieved in a satisfactory manner. A preliminary report on the last program, as well as on evaluation of the impact that the loans of the Bank had on the sector are included in the technical files of the Bank.
- 1.40 Some of the most salient results of this program were: (a) the provision of scarce resources for the continuing development of science and technology, having financed a total of 174 projects, of which 87 were with the FNDCT line and 87 were with the ADTEN; (b) the institutional strengthening of FINEP; (c) the financial strengthening of FINEP, by the institution charging positive interest rates; and (d) the institutionalization of adequate procedures for the evaluation of projects, such as economic and environmental analysis.
- 1.41 Since final disbursement of this loan occurred only this past May, an impact evaluation of the individual operations is not yet available. However, there is a partial evaluation in the technical files of the Bank on 28 projects that were carried out with Bank financing that shows that the impact was a positive one. There is also a general evaluation that shows that post-graduate university courses increased from 228 in 1969 to 1443 in 1992, of which 991 were for masters degrees and 442 for PhD's. Resources for FNDCT were instrumental in the development of the infrastructure in research and development institutions, notably, in physics and chemistry as well as engineering sciences. Between 1970 and 1992, FNDCT financed 8200 projects in 600 institutions. With regard to the ADTEN program, FINEP has financed, among others, projects in

agriculture, biotechnology, heavy industry, metallurgic industry, energy, computer science, etc. As a result of these projects new products were developed that increased national production, substitution of imports and increased productivity. As mentioned previously, in 1991 there were 18 firms certified in ISO-9000 series and by 1994 the number of firms certified rose to 410.

G. Bank support of the national development strategy

- 1.42 In addition to key areas of poverty alleviation and public sector reform, Brazil's development strategy affords high priority to continued economic openness as well as the modernization of the productive sectors. This program is fully consistent with the Government's strategy as well as that of the Bank, as articulated in the Country Paper CP-863, which was approved by the Programming Committee on June 14, 1995. The proposed program, along with other programs which help to improve labor productivity through investments in human capital, assists the Government's efforts to achieve successful insertion in an increasingly competitive global economy. A prerequisite for achieving this objective is the enhanced competitiveness of Brazilian industry — especially those sectors producing modern manufactured goods and services with a high value added content. The Brazilian industry and its crucial role in economic development of the country is described in the following paragraphs.

H. Conceptualization of the program

- 1.43 This program would provide continuity to the Bank's long-standing support in the development of the science and technology sector in Brazil. Indeed, this operation would be the seventh loan that the Bank would channel through the key institution in Brazil for the financing of science and technology programs — FINEP. Based on lessons learned from previous operations, as well as, in response to the diverse needs and changing environment in which both Brazil's industry and scientific community must compete, the proposed Program represents an important departure from the Bank's most recent operation approved in 1991 (620/OC-BR). The most salient changes introduced into the proposed Program are: (i) two new areas of scientific and technological research: social sectors and engineering; (ii) new operative modalities which would allow FINEP to widen its client base; principally through the use of financial intermediaries, a greater geographic dispersion of the Program's final beneficiaries, (that is, both research centers and private sector firms) will be achieved; (iii) stronger promotion of the linkages between the scientific community and the productive sector; (iv) greater emphasis on technical modernization projects stressing total quality management (TQM); (v) specifically targeted resources towards small and medium firms, with its positive impact on employment generation; and (vi) an increased emphasis on FINEP's administrative efficiency through performance and efficiency indicators. Through these enhancements to FINEP's activities, the

proposed program would support scientific and technological advancement, thereby enhancing competitiveness of Brazil's productive sector, and in turn, efficiently promoting economic growth.

II. THE PROGRAM

A. Program objectives

- 2.1 The program seeks to accomplish the following objectives: (a) the provision of financing for projects designed to ensure innovation and technological modernization of the country's privately owned companies; (b) the provision of financing for experimental research and development projects and scientific and technological service projects at nonprofit private and public concerns engaged in the following five priority areas: biophysics, chemistry, physics, engineering and social issues; (c) strengthening of the infrastructure of nonprofit private or public agencies devoted to the development of science and technology; and (d) forging and/or strengthening of the ties between scientific research centers and the production sector.

B. Program description

- 2.2 To accomplish the foregoing objectives, the program will consist of two subprograms: (a) Support for the development and technological upgrading of private companies through the lines of credit for technological support for Brazilian companies (ADTEN) and support for quality management (AGQ). This would consist of reimbursable financing for development and technological modernization projects presented by private enterprises, with 70% of the program funds being allocated to this component; and (b) A scientific and technological development subprogram (FNDCT), that would provide financing — through nonreimbursable transfers — for research and development projects and scientific services projects submitted by universities and nonprofit private and public research institutions; 30% of the program resources would be earmarked for this component. A detailed description of the two subprograms follows.

1. Subprogram to support development and technological modernization (ADTEN and AGQ) (US\$224 million)

- 2.3 This subprogram consists of two major credit lines — ADTEN and AGQ — that back the development and technological modernization of private companies by means of reimbursable financing for projects which may comprise infrastructure, equipment and consulting services. All privately owned enterprises that meet the criteria set forth in the Operating Regulations (available in the Bank's technical files) would be eligible. The ADTEN line would be used to finance projects in the following categories:

- a. Applied research and/or experimental development of products, including the study, design, construction and testing of

prototypes; the preparation and testing of pilot series and the development of new models and products;

- b. Applied research and/or experimental development of processes: research at the testing level, assembly of pilot plants and basic and detailed engineering designs;
- c. Technology transfer: the purchase and assimilation of national or foreign technologies deemed to be of interest for improving production processes, boosting competitive skills or similar purposes;
- d. Pioneer marketing: activities designed to help introduce new technologies in the market, including product engineering, financing of heads of series and marketing techniques;
- e. Quality control: setting of internal standards, control of materials and processes, installation of quality control laboratories, and the provision of training and the technical assistance associated with such activities; and
- f. Research and development infrastructure: the establishment of technological research centers at the individual company level or in associations of companies.

2.4 The projects that are to be financed under the AGQ line would be the following:

- a. Integrated projects: those aimed at introducing total quality management, which might include diagnostic studies, training, planning, human resources, work organization, a normative system, communications and the like;
- b. Implantation projects: projects introducing quality improvement procedures that equip the company to conform to the ISO 9000 series or similar norms; and
- c. Other projects: which call for different activities involved in human resources development programs that inculcate awareness and training in regard to quality management, the introduction of management techniques and models, auditing practices and quality certification.

2. Scientific and technological development subprogram (FNDCT)
(US\$94.4 million)

2.5 In this subprogram FINEP, in its capacity as Secretariat of the National Scientific and Technological Development Fund (FNDCT), will channel 30% of the program resources to nonprofit private and public institutions. It has been established that FINEP will use a maximum US\$55 million of that amount for projects to develop engineering skills; a maximum of US\$33.4 million for the areas of

biophysics, physics and chemistry; and a minimum of US\$6 million for the new area of social projects. The Operating Regulations (Annex II-1) authorize the projects to include the financing of equipment, materials, infrastructure and advisory services. Most of the resources would be granted on a nonreimbursable basis, unless the project specifies a priori that it will enable the entity to obtain a good or service to be marketed — in which case FINEP will apply such conditions as it may see fit for reimbursable financing.

2.6 The participating businesses and agencies and the projects that would receive financing under the present program will be selected pursuant to the criteria set forth in the Operating Regulations. The following types of projects could be financed under this subprogram:

- a. Applied research projects: those which are aimed primarily at attainment of a practical and specific objective or purpose, although not necessarily one that can be directly and immediately applied (as an example, development of a hepatitis vaccine);
- b. Basic research projects: those seeking the acquisition of new knowledge, the results of which do not necessarily have a specific use or application (example: cellular and molecular biochemistry research);
- c. Experimental development projects: systematic work projects based on preexisting work obtained as a result of research and/or practical experience conducive to the production of new inputs and products; the development of new processes, systems or services; or those designed to substantially improve items already developed and produced (example: technological alternatives for low-cost housing);
- d. Research infrastructure projects: those designed to finance the components needed to modernize and equip permanent research and development centers and laboratories (examples include projects to provide equipment and information systems for existing laboratories at research centers); and
- e. Scientific and technological service projects: those which utilize the same instruments as the sciences but do not generate any new knowledge, products or processes — they simply support research and development or help to apply and disseminate the results obtained (examples include the services rendered by the use of electronic microscope techniques).

C. Program scaling

2.7 To set the dimensions of the proposed project, the demand for financing under both subprograms, FINEP's capacity for handling

operations and the availability of local counterpart funding were taken into account. Based on FINEP's experience in managing the previous stage of the program, it may clearly be concluded that FINEP is quite capable of executing the program efficiently (see chapter IV); and that, inasmuch as the local counterpart funds will be provided by the national treasury, discussion in the following paragraphs can be confined to the demand produced by projects already in progress.

1. Demand for financing under the ADTEN/AGQ subprogram

- 2.8 At the time of the analysis mission's visit, FINEP had received 295 requests for ADTEN/AGQ financing that were potentially eligible for this program (257 for ADTEN and 38 for AGQ). They represented projects costing a total of some US\$865 million, according to a statement updating the costs to March 1995. This demand is composed exclusively of applications from private Brazilian companies; and the distribution, broken down by sector and project type, may be seen in Tables II-1 (ADTEN) and II-2 (AGQ).
- 2.9 The study of eligible demand for the ADTEN/AGQ subprogram leads to the conclusion that existing demand at present far exceeds the resources available for the subprogram. It therefore becomes particularly important to define precise criteria for prioritizing the projects that would be financed under the proposed programs in order to make optimal use of the resources and achieve the greatest possible impact from these lines. The prioritization criteria, presented in detail in chapter III, pinpoint the projects that are most likely to produce such impact, the companies that are most efficiently managed and those that operate in sectors having comparative international advantages.

TABLE II-1
DEMAND FOR RESOURCES: ADTEN LINE AS OF MARCH 30, 1995
(in US\$000)

SECTOR/ACTIVITY	PRODUCT DEVPT. 1/		PROCESS DEVPT.		R & D INFRASTRUCTURE		TECHNOLOGY TRANSFER		PIONEER MARKETING 2/		TOTALS	
	No. of projects	Amount	No. of projects	Amount	No. of projects	Amount	No. of projects	Amount	No. of projects	Amount	No. of projects	Amount
Industry	8	38,771	4	8,516	5	18,542	2	16,196	1	3,182	20	85,187
Machine tools	34	63,145	17	4,659	6	4,467	28	13,320	10	13,931	95	99,292
Electronics	60	335,365	6	9,530	14	106,005	1	4,799	7	3,443	88	458,742
Chemistry and Petrochemistry	18	61,966	6	11,185	22	72,853	1	2,032	3	5,948	50	153,984
Food and Paper	1	2,391	3	2,948	0	0	0	0	0	0	4	5,339
TOTALS	121	501,638	36	36,838	47	201,867	32	36,347	21	26,504	257	803,291

including projects combining product and process development.
including management and reorganization projects.

TABLE II-2
DEMAND FOR RESOURCES: AGQ LINE AS OF MARCH 30, 1995
(in US\$000)

SECTOR/ACTIVITY	INTEGRATED PROJECTS 1/		IMPLEMENTATION PROJECTS 2/		OTHER PROJECTS 3/		TOTALS	
	No. of projects	Amount	No. of projects	Amount	No. of projects	Amount	No. of projects	Amount
Electronics	3	4,810	0	0	2	5,541	5	10,351
Machine tools	7	8,990	6	8,817	4	6,324	17	24,121
Chemistry and Petrochemistry	5	10,470	7	7,219	2	778	14	18,467
Food and paper	1	1,157	0	0	1	7,619	2	8,776
TOTALS	16	25,428	13	16,036	9	20,262	38	61,726

including projects implementing quality management systems.
including projects for training in processes and standards.
including projects for human resource quality and training infrastructure.

2. Demand for financing under the FNDCT subprogram

- 2.10 By March 30, 1995, FINEP had received 378 applications containing projects that were potentially eligible for financing under the proposed program. The total cost involved is US\$330 million, as may be seen in Table II-3 below.

TABLE II-3
DEMAND FOR FNDCT RESOURCES AS OF MARCH 30, 1995
(in US\$000)

AREAS	TOTAL		STUDY IN PROGRESS		STUDY COMPLETED	
	No.	AMOUNT	No.	AMOUNT	No.	AMOUNT
Natural and exact sciences (life sciences, physics, chemistry)	142	171,711	105	154,196	37	17,515
Social	42	16,802	13	4,177	29	12,625
Engineering	194	141,808	123	50,705	71	91,103
TOTAL	378	330,321	241	209,078	137	121,243

- 2.11 The three natural and exact science areas eligible for this subprogram (life sciences, physics and chemistry) account for about 52% of total demand, amounting to US\$171 million. The new areas included in this program - social issues and engineering - represent 5% and 43% of total demand, respectively. The reason for the relatively small demand in the social area is that it is a new line which has only recently been promoted by FINEP. Engineering, on the other hand, has always been the target of demand from research institutions and centers. But FINEP coverage went mainly to basic subjects, leaving some unmet demand for applied research.
- 2.12 At the time of the analysis mission's visit, FINEP had already examined about 37% of the applications submitted to FNDCT. Based on the documentation, FINEP believes that no fewer than 137 projects, costing a total of US\$121 million, meet the criteria for this program.
- 2.13 Given the findings of the study, ample demand is found to exist for this subprogram, which would require FINEP to comply strictly with the priority criteria indicated in the Operating Regulations. The Bank's technical files contain a more detailed discussion of the demand for this subprogram (representative sample).

D. Program cost and financing

1. Total cost

- 2.14 The total cost of the program is US\$320 million, US\$160 million of which would be financed by a loan from the Bank's ordinary capital. A breakdown by source of financing is presented in the following table:

TABLE II-4
BREAKDOWN BY SOURCE

DESCRIPTION	IDB CONTRIB.	LOCAL CONTRIB.	TOTAL	%
Nonreimbursable FNDCT Transfers	46.4	48.0	94.4	29.5
Reimbursable ADTEN/AGQ Transfers	112.0	112.0	224.0	70.0
Inspection and Supervision	1.6	0.0	1.6	0.5
TOTAL	160.0	160.0	320.0	100.0
Percentage	50.0	50.0	100.0	

2. Local counterpart funding

- 2.15 The local counterpart funding, estimated at US\$160 million equivalent, will be provided by the federal government through transfers from its budget to FINEP. Pursuant to the Bank's operating policies, under the ADTEN/AGQ subprogram the contributions of subborrowers may be recognized as part of the total cost, up to 10% of the subprogram and subject to the requirements set forth in the Operating Regulations.

III. PROGRAM EXECUTION

A. General execution plan

- 3.1 FINEP will serve as the executing agency for the proposed program. The funds needed to finance the projects featured in the two subprograms will be transferred by the federal government as execution progresses. The borrower in this operation will be the Republic of Brazil, which will turn the loan proceeds as well as the counterpart funding over to FINEP in the form of budget allocations. Accordingly, the borrower must present evidence to the Bank's satisfaction that the transfer mechanisms for such payments are in place prior to the initial disbursement.
- 3.2 Under the ADTEN/AGQ subprogram, applications for financing of the respective projects may be presented directly to FINEP or submitted through financial intermediaries pursuant to the criteria established in the program's Operating Regulations, which must be put into effect prior to the first disbursement. When the applications are presented directly to FINEP, responsibility for the study, processing and commercial risk would be borne by that agency. When they are channeled through financial intermediaries, the responsibility for financial analysis, commercial risk and processing of the operation would lie with the intermediary. The technical study of the project would be conducted on the basis of contracts with associations that are representative of the sector (class associations); that have entered into agreements with FINEP and have received the necessary training to carry out this type of activity; and that have been engaged directly by the respective financial intermediary. The following section discusses details of the execution mechanism for this subprogram.
- 3.3 All applications for the FNDCT subprogram will be channeled through and examined and processed by FINEP. In the case of the engineering development component (US\$55 million), applications will be presented in response to announcements to be published in the most widely circulated newspapers. The bids will be evaluated by a committee consisting of representatives of the sectors involved, based on the criteria appearing in the Operating Regulations. Applications for the basic science components (US\$33.4 million) and social projects (US\$6 million) will be sent directly to FINEP. The availability of funds for these components will be announced in the most widely read newspapers, at seminars and through direct contact with universities and research centers. All requests for funds from the three components will be examined by FINEP's technical team after they have been reviewed by two independent expert consultants in the respective field or sector. The next section contains additional details concerning the execution mechanisms for this subprogram.

B. Execution of the subprograms

1. Execution of the ADTEN/AGO subprogram

- 3.4 **Execution format.** FINEP will apply the following two execution modalities for this subprogram: (a) Reimbursable financing paid directly to the end beneficiary (private company) by FINEP. This financing would be granted at interest rates that are positive in real terms, subject to the conditions and financing ceilings indicated in the Operating Regulations and summarized below; and (b) Financing through eligible financial intermediaries, for which the financing terms and the selection of financial intermediaries are explained at the end of this section. The purpose of this modality is to permit a larger share of the funds to be channeled to micro and small enterprises.
- 3.5 **Selection criteria.** Projects in this subprogram will be examined and considered on the basis of the Operating Regulations. They must comply with the following criteria, as a minimum: (a) they must be aimed at the general objectives of the program; (b) there must exist a distinct probability of achieving the desired results, with particular emphasis on the qualifications of the staff who will carry out the projects and the means they have to do so; (c) the projects must meet all requirements of Brazilian environmental legislation; (d) they must be financially profitable; and (e) those costing more than US\$1.5 million must post an economic rate of internal return amounting to no less than 12%.
- 3.6 **Prioritization criteria.** Projects will be assigned priority in accordance with scores ranging from one to three points for each of the following factors: (a) the project's impact on the company and on the sector; (b) the technological impact of the project; (c) the company's entrepreneurial capacity; and (d) the sector or line of business in which the company is engaged.
- 3.7 Following this methodology, projects would receive a score of at least four points, with a maximum of 12. Eligible projects would thus be prioritized and will compete with each other, the winners being those with the highest scores. To ensure consistency in scoring, the grade given by the professional in charge of the respective project will be reviewed by a committee and by the FINEP board of directors, who are responsible for reviewing all projects.
- 3.8 **Ceilings on financing per project and per company.** Pursuant to the norms applied in the Bank's previous loan to FINEP, unless approved in advance by the Bank, financing for each project shall not exceed US\$5 million; and the total value of all financing granted to a single company from program resources shall not exceed US\$10 million equivalent.

- 3.9 **Financial terms and conditions for reimbursable financing.** Financing for projects under the ADTEN and AGQ lines will be granted in accordance with the Operating Regulations. These conditions include: (a) terms - the maximum amortization period will be eight years, including a grace period that shall not exceed one year in addition to the project execution period; (b) monetary correction - the subloans shall be denominated in Brazilian currency and will be adjusted in accordance with national economic policy; and (c) interest rates - subborrowers will pay an interest rate known as the TJLP (long-term interest rate) set by the Central Bank and a spread of up to 6% a year; the lowest spread is to be charged on projects that generate new products and the highest on quality management and infrastructure projects. A risk fee of up to 2% per year may be added to those rates.
- 3.10 **Financial intermediaries.** FINEP's experience in financial intermediation has been acquired mainly in dealings with state development banks. In view of the financial decline of those banking agencies, and to encourage the use of these funds particularly by small and medium sized enterprises, FINEP has decided to start working with the commercial banking sector. To date, the only contract it has signed is with CREDIBANCO, although negotiations are under way with three other private banks. Some of the conditions that were accepted by the state banks - in particular, the spreads that would be given to those financial agents - would have to be revised as the number of participating private banks increases and they become more experienced in this type of operation. Given the importance of participation by these banks, the prospective loan contract will stipulate that at least 25% of the funds under this subprogram are to be channelled through commercial financial intermediaries. The operating conditions would be the following:
- a. Selection of banks. (i) All participating banks must be members of the Brazilian Bank Federation (FEBRABAN); (ii) an overall financial analysis will be conducted of candidate banks, and (iii) the experience and performance rating of the candidates in the financing of microenterprises and small businesses will be evaluated by FINEP.
 - b. Risks. The commercial risk is assumed in its entirety by the financial intermediary. Accordingly, the financial agent will be responsible for the financial studies of the beneficiaries as well as the guarantees.
 - c. Interest rates. The financial intermediaries will charge a rate equal to cost of FINEP funds, (TJLP + FINEP spread) plus a bank spread ranging from 2% to 2.75% - the higher rate being applicable to projects with greater commercial risk. The difference in the spread is absorbed by FINEP, so that the interest rate paid by the end beneficiary will be the same

regardless of whether the loans are granted directly by FINEP or through the financial intermediaries.

- d. Technical evaluation of projects. In the case of micro-enterprises and small businesses, the technical evaluation of projects will be conducted by various organizations representative of the particular type of company, pursuant to a contract with the financial agent. An example of such a representative organization is the Brazilian Association of Electro-Electronic Industries (ABINEE). In the absence of a contract with an association of that kind, FINEP itself will be responsible for the technical evaluation. The financial intermediary will defray the cost of the technical evaluation, using 0.25% of the spread collected from the borrower to do so.
- e. Ceilings on financing. The initial limits will be US\$500,000 per project and US\$1.5 million per company.

2. Execution of the FNDCT subprogram

- 3.11 Execution format. The resources of this subprogram will be channeled to nonprofit private and public institutions and centers in the form of nonreimbursable financing. The criteria for selecting the institutions or centers as well as the projects are described in detail in the Operating Regulations and are summarized in the following paragraphs. The FINEP technician for the corresponding area evaluates the projects' technical merit on a blind basis, i.e. without knowing the applicant's name, after they have been evaluated by two external consultants who are experts in that particular area. Each project is then presented to an inter-disciplinary technical committee and then to the FINEP board of directors for final approval. The criteria for selecting the institutions and projects are similar to those of the previous program. Also, in order to reach the less favored areas of the country in choosing the centers of excellence, the selection will not be limited to those recognized by the Agency for Coordination of Advanced Training of High-level Personnel (CAPES). It will also be extended to include all centers or institutions that have displayed a potential for reaching that level and are located in Brazil's most depressed areas (the North, Northeast and Center) which may submit projects in the five subprogram fields.
- 3.12 To select the projects, a prioritization system has been designed that will facilitate the choice and make it more objective. The system is based on the assignment of points, in which greater weight is given to a certain type of project deemed to meet priorities for the development of science and technology. A noteworthy example is the relatively great importance accorded to applied research projects in institutions which take part in financing of the private production sector.

- 3.13 **Selection criteria.** The projects in this subprogram will be examined and considered on the basis of the Operating Regulations, and they must meet the following requirements as a minimum: (a) they must be aimed at the general objectives of the program; (b) there must be a high probability of attaining the desired results, considering the qualifications of the staff who will execute them and the means available for doing so; (c) they must be proposed by research centers or institutions of proven excellence or whose recognized potential for providing high quality service to meet the needs of one of the country's various regions is particularly crucial to maintain and strengthen; (d) they must be a part of or contribute to research areas which have been given priority status but are hobbled by shortfalls of resources or infrastructure; (e) applied research projects must have a minimum contribution of 10% from the productive sector; and (f) they must fall within (i) the areas of physics, chemistry or life sciences; (ii) engineering areas featuring special scientific and technological dynamism for which there is proven demand in the productive sector, and (iii) human and social science areas aimed at poverty reduction.
- 3.14 **Prioritization criteria.** Projects that have been rated eligible by FINEP based on the criteria cited above will be assigned priority in accordance with point scoring that ranges from one to five points for each of the following indicators: (a) rating of the center's or institution's performance; (b) the project's intrinsic merit, if it is innovative or will lead to new and important discoveries that affect society at large; (c) the useful nature or relevance of the research; (d) the impact on the science and technology infrastructure; and (e) financial participation by any segment of the private production sector in the project or in the institution. The project will be given five points when the private sector contributes over 50%; four points for 41% to 50%; three points for 31% to 40%; two points for 21% to 30%; and one point for 11% to 20%.
- 3.15 The projects will be rated in the four areas cited above and assigned point scores of one to five. A weighted average is being developed, however, to distinguish between applied and basic research. It is explained in Table III-1, which follows.

TABLE III-1

CRITERION	WEIGHTED AVERAGE	
	BASIC RESEARCH	APPLIED RESEARCH
Performance rating	0.4	0.4
Intrinsic merit	0.3	0.1
Usefulness of the research	0.1	0.3
Impact on infrastructure	0.2	0.2
Private sector participation	0.3	0.3
TOTAL	1.3	1.3

- 3.16 As may be seen in the matrix, greater weight is assigned to the project's intrinsic merit in the case of basic research, and greater weight to its usefulness in applied research; all the other components are weighted equally. Project scores may range from a minimum of 1.3 to a maximum of 5. They will be rated in order of priority and will compete with each other: the projects with the highest scores will be the ones selected.
- 3.17 Limits on financing for projects and centers. These will be the same as the ceilings for the ADTEN and AGQ subprogram (see paragraph 3.8).
- 3.18 Limits on financing per area or sector. The US\$94.4 million in funding assigned to this subprogram will be distributed in the following manner: up to US\$33.4 million equivalent for projects in the life sciences, physics and chemistry; up to US\$55 million equivalent for engineering projects; and a minimum of US\$6 million for the social area. The distribution agreed upon is based on the demand presented and the importance attributed to each of the areas. A required minimum level of funding had to be established in order to guarantee the execution of projects of social interest. The engineering field is extremely important because of its rapid assimilation by the private sector; given the size of the projects and the demand shown, however, a ceiling amount had to be imposed to avoid overconcentration in this area. Similarly, it was deemed important to limit the amounts assigned to the basic science areas.

C. Status of program preparation

- 3.19 As noted earlier, a significant number of the projects comprising the demand for both subprograms have already been examined by the relevant FINEP departments or are now undergoing evaluation. The analysis mission was thus able to select a sample of projects for

each of the subprograms. A review of those projects provided an idea of the basic features, the present degree of progress in each and the analysis methodologies used by FINEP for this purpose.

- 3.20 Twenty-six projects have now been reviewed for the ADTEN/AGQ subprogram and another 18 for the FNDCT subprogram. The Bank's technical files contain details of the sample that was reviewed and the various specific factors that were examined by the mission. The results of that analysis show that a number of projects were assessed pursuant to the methodologies described in the Operating Regulations and agreed upon for the previous loan (620/OC-BR). This will permit immediate placement of the program's initial funds.

D. Terms and execution schedule

- 3.21 The deadline for commitment of the program resources will be 24 months from the date the loan contract is signed and the term allowed for disbursements will be 48 months from that same date.
- 3.22 The schedule for disbursement of the resources is shown in the following tables:

TABLE III-2
FNDCT Disbursements

SOURCE	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
Local contrib.	9.6	14.4	14.4	9.6	48.0
IDB	9.6	14.4	14.4	9.6	48.0
TOTAL	19.2	28.8	28.8	19.2	96.0
Percentage	20%	30%	30%	20%	100%

TABLE III-3
ADTEN/AGQ Disbursements

SOURCE	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
Local contrib.	22.4	33.6	44.8	11.2	112.0
IDB	22.4	33.6	44.8	11.2	112.0
TOTAL	44.8	67.2	89.6	22.4	224.0
Percentage	20%	30%	40%	10%	100%

TABLE III-4
Program Disbursements

SOURCE	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
Local contrib.	32.0	48.0	59.2	20.8	160.0
IDB	32.0	48.0	59.2	20.8	160.0
TOTAL	64.0	96.0	118.4	41.6	320.0
Percentage	20%	30%	37%	13%	100%

E. Retroactive expenditures

- 3.23 During its analysis of the present operation, the project team reviewed a number of projects which meet the criteria stipulated in the Operating Regulations - for both the ADTEN/AGQ and FNDCT subprograms - and which have already been approved for financing by FINEP. The team finds that the expenses incurred for contracts signed in connection with those projects could be recognized as reimbursable outlays equivalent to US\$32 million. Half of that amount (US\$16 million) would be reimbursed chargeable to the loan resources and the other half would be charged to the local counterpart funding.

F. Advance of funds

- 3.24 Since the inherent nature of the program is such that readily available funds will be required, it is recommended that provision be made for an advance of funds chargeable to the prospective loan, in an amount not to exceed 10% - in other words, US\$16 million.

G. Procurement of goods and services

- 3.25 The procurement of goods and the contracting of civil works will be conducted in accordance with the procedures set forth in Annex B to the loan contract. For consulting services, Annex C - which calls for international public tender for amounts in excess of US\$200,000 - will apply. Such bidding will be compulsory for the procurement of goods costing more than US\$350,000 and on construction costing more than US\$5 million. These levels are justified by the fact that scant international interest was displayed in similar projects in the country when the contracts were for smaller amounts. Public bidding on amounts below the stated limits will be conducted in accordance with Brazilian law, which requires public tender and does not preclude international bidders on items costing more than US\$100,000 equivalent; permits private tender for less than that figure; and is compatible with the Bank's procedures.

- 3.26 The stipulations of the preceding paragraph notwithstanding, in the procurement of specialized laboratory equipment, books and other publications, the Bank may authorize direct purchase provided that the borrower so requests and indicates the reasons for the request along with the procedures it would use, in conformity with the objectives of the financing. In any case, the procurement procedure, as well as each individual purchase or contract entailing more than US\$25,000 equivalent, will require prior approval by the Bank.

H. Maintenance of works and equipment

- 3.27 The borrower, through the executing agency, has undertaken to include a commitment in the financing agreements with the beneficiaries to the effect that the works and equipment financed under the program will be operated and maintained in accordance with generally accepted technical standards; that there will be a satisfactory staff complement; and that the necessary materials will be provided to permit efficient functioning of such works and equipment.

I. Supervision, follow-up and operation

- 3.28 Responsibility for executing the program will be assigned to the executing unit located in the management division in charge of IDB accounts. The unit already exists and is part of the FINEP Resource Mobilization Department. Its staff has the requisite technical skills and a long record of experience in operations financed by the Bank. The unit also has the necessary infrastructure, suitable equipment, information systems and institutionalized follow-up procedures that are satisfactory. The Bank's Country Office in Brazil will be responsible for the IDB supervision.

J. Environmental conservation

- 3.29 The program under review here has been classified as a Category II operation, pursuant to a resolution adopted by the Bank's Environment Committee on September 20, 1994. All financing contracts signed by FINEP in both subprograms will nevertheless include the beneficiary's or subborrower's obligation to comply with all applicable requirements of Brazilian law in regard to protection of the environment.
- 3.30 It is important to point out that FINEP has set up an Environmental Coordination Office that will be responsible not only for examining research and development projects directly related to the environment, but also for reviewing every project which might produce possible adverse effects. The Office would then draw up pertinent recommendations for easing such impact insofar as it affects the environment.

K. External audit

- 3.31 The program financial statements throughout the execution period — as well as those of FINEP up to five years after the year in which the final disbursement of the loan takes place — shall be audited by the Federal Oversight Office of the Ministry of Finance.

L. Program review and monitoring

- 3.32 In order to monitor execution of both the present program and the one financed by loan 620/OC-BR, two intermediate evaluations will be conducted: one when 12 months have elapsed since the date the program goes into effect and the other at 30 months. The evaluation will compare the findings of a sample of 15% of the projects with the results projected at the time the applications were submitted. The Bank and FINEP will review the results jointly and will make any adjustments deemed necessary in the current program, based on those results. Among the matters subject to review in the course of evaluation, special attention would be given to the following: the percentage of funds under the ADTEN/AGQ subprogram channelled through commercial financial intermediaries, the percentage of funds directed to small and medium-sized enterprises, and the percentage of productive sector contributions to applied research projects under the FNDCT subprogram.

M. Program impact

- 3.33 The executing agency has informed the Bank that it will not be conducting ex post evaluations. Accordingly, to measure the program's impact, it is proposed that FINEP and the Bank annually monitor the indicators shown in Annex III-1, starting 12 months after the loan contract enters into effect. The executing agency shall present a report at the close of each year, specifying the degree of progress made in program execution and the goals attained by each component of the program. The adoption of these indicators will be a condition precedent to the first disbursement under the prospective loan.

IV. THE EXECUTING AGENCY

A. Institutional analysis

1. FINEP: nature, objectives and functions

- 4.1 FINEP, a public agency attached to the Ministry of Science and Technology, was created by Decree 61,056 of July 24, 1967 and is governed by its own by-laws, the last amendment to which was approved by Decree 992 of November 25, 1993. Its purpose is to support studies, projects and programs of interest to the country's economic, social, scientific and technological development, taking into account the sectoral priorities and goals established by the federal government.
- 4.2 FINEP is the federal government's principal financial agent in its policy of support and financing for the country's scientific and technological development. The experience the agency has acquired in two important segments of the innovation process - research centers and companies - allows it to serve as the Science and Technology Ministry's means of action in all phases entailed by the creation and assimilation of know-how in processes and products.

2. Organizational structure and general management

- 4.3 The most recent analysis of FINEP's organizational structure was conducted in 1991 in connection with studies for loan 620/OC-BR, which was used to finance the Scientific and Technological Development Program executed by FINEP.
- 4.4 Starting in 1992 when it carried out a program of administrative upgrading, FINEP has introduced a series of changes in its organizational structure. The overall result brought a better division of financial activities, separation of execution and control activities, and greater efficiency in loan analysis and recovery.
- 4.5 As stated earlier, the changes introduced in its organizational structure were part of a broad institutional modernization project that has not yet been carried out in its entirety. A number of initiatives aimed at improving performance levels and streamlining the company's executive and decision-making activities are in the process of being fully implemented.
- 4.6 These initiatives in the administrative and managerial areas included expansion of the institution's physical space with a move to new offices. Data processing was upgraded with the acquisition and leasing of some 300 of the latest generation of new computers; expansion of the internal and external communications systems; and heightened automation of procedures. The schedule for the present six-month period calls for installation of a new mechanism for

converging data by means of an automatic program, the Management Information System. This will permit operation of a decentralized system, fed and controlled by various units of the company, to assemble all of the data and information concerning the FINEP's productive, financial and managerial processes. It will expedite the flow of information, facilitate monitoring of operating procedures and allow closer control of responsibilities. Given the importance of that system, its implementation in FINEP will be stipulated as a contractual condition, to be performed within 12 months after the effective date of the prospective loan contract.

3. Personnel

- 4.7 The FINEP staff complement has remained virtually unchanged over the past five years in terms of the number of employees and their technical and administrative duties. Except for nearly 100 resignations that were encouraged in 1990 by means of a retirement package - resulting in a 15% cutback in staff - there have been no significant changes during that period, although some of the technical staff have been transferred among the different departments of the agency.
- 4.8 The following table shows the present structure of FINEP's technical and administrative staff as of December 1994:

Executives	29
Professionals	321
Economists	82
Engineers	59
Lawyers	34
Admin. technicians	47
Accountants	16
Other	83
Administrative staff	<u>248</u>
TOTAL	919

- 4.9 In the quest for modern administrative techniques, a broad staff training program was carried out in recent years. It included in-house and outside courses and seminars specially designed to meet the company's needs and offered through consulting firms and specialized university centers. The courses scheduled for 1995 in the various areas of interest - mainly computer science and finance - call for expenditures in the amount of US\$1.4 million.

4. FINEP's internal operating procedures

- 4.10 The operating procedures in FINEP's administrative structure are appropriate for the analysis, execution and evaluation of its financing operations. Significant improvements were apparent in the financial and economic analysis activities, thanks to upgrading and standardization of the respective procedures and the holding of

specialized courses. The agency has guidelines, flow charts and operating procedures for systematic conduct of the consultation stages prior to the processing of applications for financing.

5. Operating capacity

- 4.11 The services offered by FINEP - scientific and technological development programs and projects - along with its financing modes and conditions are the principal indicators used to assess the agency's operating capacity, since they are based on its own procedures that are carried out in house, or external ones when performed by financial agents.
- 4.12 FINEP's operating performance over the past five years, as displayed in the evolution and composition of its credit activities, may be seen in the following table:

TABLE IV-1
NUMBER OF OPERATIONS / CONTRACT AMOUNTS / DISBURSEMENTS
(in US\$000)

YEAR	ADTEM/AGA			FNDCT			OTHER		
	CONTRACTS		AMT. DISB.	CONTRACTS		AMT. DISB.	CONTRACTS		AMT. DISB.
	No. OF OPS	AMOUNT		No. OF OPS	AMOUNT		No. OF OPS	AMOUNT	
1990	50	8,336	5,225	645	138,494	50,034	197	10,509	10,168
1991	50	13,538	15,129	376	58,416	17,878	266	33,607	29,121
1992	117	122,805	98,615	305	39,918	28,342	83	19,382	9,245
1993	136	167,318	175,868	335	42,003	57,163	131	25,170	18,559
1994	103	166,001	140,623	449	87,078	48,043	77	30,876	31,093

- 4.13 These indicators of FINEP's operating capacity in recent years reflect the cycles in which its activities expanded and declined. They are strongly influenced by the availability of funds in the federal government's budget for allocation to the agency. Starting in 1991, however, the new government policy modernizing Brazil's industries entered into effect. As a result, the official development agencies - such as the BNDES, BNB, BB and FINEP - became eligible for larger amounts of funding earmarked for technological research and development. In the case of FINEP, that policy not only led to a renewal of its operations but also expanded its financial capacity, thanks to the increase in capital afforded by IDB loan 620/OC-BR, the increase in the government's budget resources for FNDCT, and new fund-raising operations with the FND and, more recently, with the Workers' Support Fund.

6. Accounting and audit

- 4.14 The company's books are kept by the Financial Execution Department, a part of Operations Directorate III. Since it is a public company operating pursuant to private law, FINEP follows the federal government's account system, has an internal auditing unit and is subject to external audit reviews conducted regularly by the tax officials. The internal auditing unit is directly linked to the agency's supervisory Council. At present, it has a staff of 16 persons, 13 of whom are members of its corps of technicians. In 1993, FINEP responded to internal calls for institutional modernization by shifting the thrust of its activities to operational audits, placing greater emphasis on the assessment of internal controls and monitoring of compliance with standards as well as more distinctly preventive action.
- 4.15 FINEP is also subject to the following external audit reviews: the Federal Accounts Tribunal and the Science and Technology Ministry's Internal Control Secretariat associated with the Federal Control Secretariat. That office, created in November 1994, is responsible for the performance and the technical and normative guidance of all federal government audits, inspection and management evaluation activities. The audits - which include an examination of the financial statements for projects financed by the IDB - were the responsibility of the National Treasury Secretariat up to 1994. The most recent audit reports on the project and on FINEP (1993) contained no reservations or recommendations concerning internal controls.

7. Interest rate structure and policy

- 4.16 The prevailing structure of institutional interest rates is established in the applicable guidelines issued by the federal government. The major reference rate is the long-term interest rate (TJLP), which is calculated and set by the Central Bank based on average returns in local currency, for the quarter immediately previous, on long-term foreign and domestic public debt securities available for voluntary purchase. The TJLP would take into account only foreign debt securities having a redemption period of two years or more, including *bonus de redução inicial de juros*, C bonds, El bonds, and others to be issued in future. Domestic debt securities having maturities over six months would be taken into account as well. The TJLP would be calculated on the basis of annualized average returns, assigning a weight of up to 70% to foreign securities and a weight of at least 30% to domestic securities.
- 4.17 The TJLP was introduced by means of provisional measure 684 of October 31, 1994, and took effect on December 1, 1994, adjustable quarterly. For the quarter from June to August 1995 it is set at 24.75% per annum. The TJLP is composed of a variable indexation factor, which is applied to the capitalization of contract amounts,

and a fixed interest rate of 6% per annum. On its for-profit operations, in addition to the TJLP, FINEP applies a spread of up to 6% per annum, depending on the type of operation, and a variable risk fee of up to 2% per annum. FINEP also charges an inspection and supervision fee equivalent to 1% of the financing, so that the total return on all operations carried out is positive in real terms. The operating charges applied by FINEP, consisting of the spread and risk fee, are real charges applied in addition to the TJLP.

B. Financial analysis

1. Summary and conclusions of the financial analysis

- 4.18 Although the institution has been operating for almost 30 years, for a long time it carried out the government's policy decisions by granting sizable subsidies to domestic companies engaged in the execution of research and development and preinvestment projects characterized by negative real interest rates and prolonged amortization periods. The same policy — which was also applied by other financial agents of the federal government — not only made it impossible to build up assets that could generate sufficient revenue to cover operating expenses, but triggered a series of operating losses which sharply reduced their liquid assets.
- 4.19 As of the eighties, however, that paternalistic financial policy changed, giving rise to a restoration of the institution's financial health. In 1992, when the contract for IDB loan 620/OC-BR was signed, the funds it provided as a capital contribution to FINEP imbued the agency with new dynamism and led to the implementation of a new line of administration, geared to achieve financial soundness and capitalization of the institution. The result was a surge in its economic and financial indicators. Various additional measures of an operational and financial nature were taken to consolidate the process. The most salient among these were: an increase in the sources of funding; changes in lending terms and conditions, with higher real interest rates and shorter amortization periods; a more aggressive collection policy; and improved credit analysis techniques.
- 4.20 These measures, coupled with the input of capital provided by the latest IDB loan operation, made it possible to boost FINEP's operating capacity. The increased earnings and operating revenue triggered a cycle that further favored FINEP's capitalization. To continue the process and attain the objective of financial self-sufficiency, the company is now expanding its financial capacity through negotiations with new sources of funds. The prospective IDB loan with the Government of Brazil as borrower is expected to ensure a satisfactory balance of its own capital and third-party funding in addition to the resources needed to make the operations self-sustaining.

2. Financial situation

- 4.21 The present management of FINEP is responsible for the marked increase in the agency's efficiency over the last three years, which has resulted in a considerably rosier financial picture. In contrast to the critical situation reached in 1990-1991, the systematic efforts aimed at financial restructuring and capitalization of FINEP have radically improved its financial and operational management.
- 4.22 Among the numerous measures deployed to that end, the following should be highlighted: (i) the interest rate on new contracts was raised and the period for payment was shortened in keeping with market-determined parameters; (ii) non-performing assets were reduced from 17% in 1991 to 12% in 1993 and overdue payments on new lending operations represent about 2% of total loans; (iii) new terms were negotiated for long-standing arrears, and (iv) intensified efforts to find new sources of funds resulted in US\$300 million from the Workers' Assistance Fund, US\$100 million from the IDB (plus US\$100 million in counterpart funding from the Government of Brazil), US\$91.7 million from the National Development Fund, and US\$10.9 million from the Montreal Accord.
- 4.23 As a result, FINEP's liquid assets rose considerably since 1991, reaching US\$234.3 million by December 1994. This reduced the indebtedness rate (the ratio of total debt to liquid assets plus total debt) from 0.87 to 0.54. Contract operations, which amounted to US\$105.6 million in 1991, rose to US\$285.3 million by the end of 1994 (see Table IV-2). Interest income surged from US\$365,000 in 1991 to US\$4.8 million in 1992, then slightly over US\$9 million in 1993, and US\$24.7 million in 1994, while FINEP earnings rocketed from minus US\$100,000 in 1991 to US\$62.5 million in 1994. These favorable results were produced by the increase in interest rates as reflected in the average rate of return on the FINEP portfolio, which climbed from 2% in 1992 to almost 6% in 1994 upon the recognition of full indexing of its portfolio and implementation of the Brazilian government's capitalization policy (see Annexes IV-3 through IV-7).

TABLE IV-2
1991-1994 FINEP INDICATORS
(in millions of US\$)

FINANCIAL INDICATOR	1991	1992	1993	1994
Liquid assets	20.2	27.4	80.0	234.3
Indebtedness (debt/liquid assets)	0.87	0.86	0.68	0.54
Interest income	.365	4.8	9.04	24.7
Earnings	(0.1)	24.4	27.1	62.5
Average return on portfolio		2%	3.6%	5.8%

3. Loan portfolio

- 4.24 Total arrearage in the FINEP loan portfolio amounted to 7.9% as of December 31, 1994, pointing to a gradual annual reduction during the period under review. The overall balance owed on old loans — now in the process of legal collection — accounts for 95% of the total figure. It drops to about one percent when only the financing contracts signed since 1992 (70% of the total portfolio) are taken into account. All of the loans granted are covered by real guarantees and the provision for bad debts is 1.5% of the financing portfolio classified as short-term.

4. Strategy and financial projections

- 4.25 The premises and criteria adopted for the financial projections are available in the Bank's technical files.
- 4.26 The principal FINEP strategy in recent years has been to secure funds in order to reduce its financial dependence on budget allocations from the National Treasury and gradually achieve a level of operations producing a rate of return that will make its activities self-supporting. To achieve this higher degree of financial autonomy whereby its earnings on operations will suffice to defray the expenses entailed thereby, the agency has been adopting a series of measures in recent years. These include: action to secure financing from the IDB for use as a capital contribution from the Government of Brazil; mobilization of new financing; adoption of a more aggressive collection policy, along with the renegotiation of nonperforming loans; increased fees on active operations; and the implementation of changes in its operating system to make it simpler and more efficient.
- 4.27 According to the financial projections, confirmation of the IDB funds will enable FINEP to count on a total additional volume of some US\$660 million for investments over a five-year period. A total portfolio of financing in the amount of US\$650 million is anticipated for 1995 (US\$481 million as of December 1994).

5. Efficiency indicators

4.28 The following figures were drawn up on the basis of FINEP's financial projections:

TABLE IV-3
EFFICIENCY INDICATORS

	1995	1996	1997	1998	1999
Interest/gross earnings	.80	.86	.87	.89	.89
Op. costs/disbursements	.15	.11	.13	.09	.16
Payroll/disbursements	.12	.08	.13	.07	.13

4.29 To ensure that FINEP meets its commitments in the area of science and technology at a reasonable cost, and that its operations can be supported by the earnings thereon, an agreement has been reached with FINEP that the indicator of operating expenses shall not exceed 0.13 and that of payroll outlays shall not exceed 0.10 during the project execution period. To attain those goals, FINEP will have to boost its volume of operations or reduce its expenditures, particularly in 1995, 1997 and 1999. These indicators will be reviewed each year along with the monitoring and evaluation indicators, and are included in Annex III-1 hereto.

V. PROGRAM VIABILITY AND RISKS

A. Economic viability

1. ADTEN/AGO

- 5.1 The economic analysis of this component is based on an examination of five projects financed previously by the Bank and a representative sample of those to be financed under the present program.
- 5.2 The preliminary evaluation of the ADTEN line leads to the conclusion that, on the whole, both the financial and the economic rates of return are satisfactory. The economic rates of return on the different projects have posted significant variations. The IRRs on a sample of five projects already financed by the Bank ranged from 23% to 145%, while the cost-benefit ratio varied between 1.46 and 7.86. Interest rates on the subloans were positive in real terms despite the fact that they were far below the international market level. Almost 98% of the subloans in the last three years have been repaid, thus showing the financial return on the operations covered to be acceptable. The financial rates of return on the projects in the sample averaged 20%, and all of them were over 12%. Given the conditions for opening the market and the relatively low opportunity cost of labor in Brazil, it can reasonably be assumed that the economic rates of return will be equal to or higher than the financial ones. The Operating Regulations include the requirement that the projects have a financial rate of return of more than 12% as a condition for eligibility. Similarly, the projects costing more than US\$1.5 million will require a financial rate of return over 12%. This will ensure that the economic benefits of the projects financed will be more than the implicit costs.

2. FNDCT

- 5.3 When basic research or higher education activities result in an increase in the country's stock of knowledge or take on other characteristic features of a public good, there are externalities which justify supporting such research through public subsidies, since in such cases the private returns do not fully reflect the additional contribution to society at large. As a result, the proposed program will support the achievement and development of such externalities, thus assisting in the efforts at modernization currently being deployed by Brazil. Such support is fully warranted from the socioeconomic standpoint.
- 5.4 The review of the FNDCT activities shows that this agency has played a strategic role in developing the country's 400 research groups, in particular those located outside São Paulo. Prominent among them are the groups working in applied physics in Pernambuco,

the development of pharmaceuticals in Minas Gerais, computer programs in Rio, mechanical engineering in Santa Catarina, and sciences in Rio Grande do Sul. In addition, FNDCT has acted as a catalyst in promoting ties between researchers and the production sector, as well as the Support Program for Technical Partnerships between Universities and Business (FINEP-TEC), whose purpose is to stimulate participation of university research units in projects and programs for the technological development of industries and agriculture.

3. Impact on low-income groups

- 5.5 The nature of the program is such that a rigorous analysis of its impact on low-income beneficiaries cannot be performed. The benefits accrue to a highly heterogeneous population at different periods of time, or are simply not quantifiable because additional subsequent investments are needed to incorporate the technological or scientific advances. It is also difficult to determine precisely how much improvement in the living conditions of the low-income population has been achieved by the adoption of a specific technology, especially if that instrument has undergone a series of transformations when utilized by society as a whole.
- 5.6 It can nevertheless be posited that the basic and applied research programs would have a positive effect on low-income groups. The research financed by FINEP to develop a vaccine that will improve the production of cattle and thus reduce the price of meat, or the development of lower-cost vaccines against cancer or other diseases -- to cite a few examples -- would logically become direct benefits for the low-income population. Similarly, the competitive improvement of companies thanks to ADTEN and AGQ programs will enable them to expand and grow, thus helping to generate job opportunities -- particularly in small and medium-sized enterprises. At the same time, FINEP financing for research in the social sectors will provide critical information to help the country cope more efficiently with the present social problems.
- 5.7 Despite the favorable social impact that would be produced by the present program, it does not fit in any given social category nor is it aimed specifically at the low-income sector. Consequently, we cannot conclude that it directly benefits a larger group than the percentage of poor in the total population, as defined in paragraph 2.15 (b) of the Eighth Replenishment document (document AB-1704).

B. Technical viability

- 5.8 The Operating Regulations contain guidelines for projects and activities to be evaluated pursuant to suitable technical criteria and to ensure that the program resources are earmarked for projects that will help to develop new products and technologies for the benefit of society at large. Special care has been taken to

structure the operation in such a way that it serves as a catalyst to forge ties between research and the productive sector and to improve the production processes used by private companies in Brazil, thus enabling them to compete in world markets. FINEP will apply eligibility and project analysis requirements that are designed - in the context of the uncertain conditions inherent in financial activities - to maximize the project's impact on the national production of goods and services, in the short and medium terms in the case of ADTEN/AGQ and in the long-term in the case of FNDCT.

C. Institutional viability

- 5.9 FINEP has recently made substantial improvements in its organizational and operational structure. The realignment, which covers both technical and administrative areas and is considered to be justified and adequate, is predicated on the specific needs of the institution and complies with the policy directives for scientific and technological development issued by the Government of Brazil.
- 5.10 The analysis shows that FINEP has a critical mass of highly qualified staff for execution of the proposed program, as well as suitable operating procedures to process satisfactory financing operations. The methodologies specified in the Operating Regulations for project evaluation and analysis are acceptable to the Bank. This new program will help to heighten the agency's operational efficacy.

D. Financial viability

- 5.11 Over the almost 30 years of its existence, FINEP has been considered to be an institution supported by transfers from the central government's budget. That image began to vary at the end of the eighties and improved sharply as of 1992 with the signing of the 620/OC-BR loan contract, which required that interest rates on subloans granted to companies be positive in real terms. That requirement, combined with the use of resources from the program to capitalize FINEP plus other operational and financial measures, enabled FINEP to start cleaning up its portfolio and to obtain the capital it needs to perform effectively.
- 5.12 These measures and the injection of capital from the most recent IDB loan allowed FINEP to raise its operating capacity as a result of the increase in income and revenue from its activities. It is believed that the additional capital provided by the resources of the proposed program, as well as those from other sources, will considerably improve the agency's financial situation and further reduce its dependence on allocations from the federal budget.

E. Risks

- 5.13 The main risk implicit in the program will be FINEP's initial use of private banks as financial intermediaries. Thus far, the agency's experience has been confined to its relatively limited experience with state-owned banks. No proof has yet been presented that the private banking sector will be able to accommodate the clientele of micro and small-scale entrepreneurs for purposes of science and technology projects. Neither have the proposed mechanisms for technical evaluation of such projects been shown to be capable of ensuring attainment of the sector's objectives.
- 5.14 To lessen these risks, it is proposed that FINEP present for the Bank's approval, prior to the first disbursement, models of the contracts which it would sign with the financial intermediaries, along with the prospective agreements to be signed with class associations to conduct the technical evaluations. Also proposed are interim evaluations to monitor the success of financial intermediation. The first of these would take place 12 months after the effective date of the loan contract.

Annual Selection Indicators

During the program execution period, FINEP must compile the following annual data to be used for evaluation of the program.

A. General information

1. Results

- a. The increase of companies in the ISO-9000 category;
- b. The increase in the percentage of investments in science and technology as a share of GDP;
- c. The increased percentage of private sector investments in science and technology;
- d. The number and total value of applications submitted, broken down by financing modality and project type;
- e. The number and total value of applications approved, broken down by financing modality and project type;
- f. The number and value of projects approved and executed, by project type;
- g. The increase in funds under the ADTEN/AGQ subprogram channelled through financial intermediaries;
- h. The increase in funds directed to small and medium-sized enterprises; and
- i. The increase in the percentage contribution from the productive sector to applied research projects under the FNDCT subprogram.

B. Specific information

1. Projects for innovation or technological updating of the private sector (ADTEN/AGQ)

a. Goals and features

- i. The industrial sector in which the company's principal activity is conducted; the percentage of production sold abroad; and the company's location;
- ii. The type of innovation incorporated; improvement achieved in processes and products; new products or production lines; the adaptation of technology; and the adoption of technological management systems;

- iii. The type of real impact anticipated as a result of project execution, in terms of: cuts in production costs, increases in output or yield, and improvement in quality.

b. Results

- i. the projects' financial internal rate of return;
- ii. the economic rate of internal return for projects costing more than US\$1.5 million; and
- iii. the increase in FINEP's portfolio of loans to small and medium-scale enterprises.

2. Research projects (FNDCT)

a. Goals and features

- i. Users identified as interested in adopting the results of the research (in the case of applied research projects);
- ii. The type of innovation to be adopted or that which a company would like to adopt: improvement in processes or products; new products or production lines;
- iii. Estimated time required to execute the projects;
- iv. Total project costs as compared with those anticipated at the outset; and
- v. Components of project costs: staff salaries, purchase of equipment, construction of civil works; subcontracts for third-party services.

b. Results

- i. Results obtained as compared with those anticipated at the outset. If any results have yet to be determined, they should be indicated and explained;
- ii. The real impacts produced or anticipated;
- iii. Dissemination of results, publications, patents;
- iv. The percentage of FNDCT results used to finance projects in the social sectors; and

- v. Any increase in the private productive sector's participation in projects financed through the FNDCT.

Efficiency indicators

	1995	1996	1997	1998	1999
Interest/gross income	.80	.86	.87	.89	.89
Operating expenses/disbursements	.15	.11	.13	.09	.16
Personnel expenses/disbursements	.12	.08	.13	.07	.13

To ensure that FINEP can carry out its mandate in the area of science and technology at a reasonable cost, and to make its operations sustainable on the basis of operating income, an agreement has been reached with FINEP that the operating expenses ratio is not to exceed 0.13 and the personnel expenses ratio is not to exceed 0.10 throughout project execution.

PROPOSED RESOLUTION

BRAZIL. LOAN /OC-BR TO THE REPUBLICA FEDERATIVA DO BRASIL
Science and Technology Program

The Board of Executive Directors

RESOLVES:

That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with the Republica Federativa do Brasil, as Borrower, for the purpose of granting it a financing to cooperate in the execution of a Science and Technology Program. Such financing shall be for the amount of US\$160,000,000 or its equivalent in other currencies, except that of the Republica Federativa do Brasil, which are part of the Ordinary Capital resources of the Bank. The financing shall be subject to the "Special Contractual Conditions" and the "Terms and Financial Conditions" of the Executive Summary of the Loan Proposal.