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FROM - RIO DE JANEIRO

SUBJECT - NON CAPITAL PROJECT PAPER (PROP)
Engineering Education

REFERENCE -

COUNTRY: BRAZIL

PROJECT: 512-11-660-^{300,2}263.2

SUBMISSION DATE: October 23, 1969

ORIGINAL: X

PROJECT TITLE: Engineering Education

U.S. OBLIGATION SPAN: FY 1963 through FY 1970

PHYSICAL IMPLEMENTATION SPAN: FY 1963 through FY 1971

GROSS LIFE OF PROJECT FINANCIAL REQUIREMENTS:

U.S. Dollars \$1,285,000

Local Currency (Trust Funds in US\$) 92,000

Total \$1,377,000

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DRAFTED BY	OFFICE	PHONE NO.	DATE	APPROVED BY:
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I. SUMMARY DESCRIPTION

A. Necessity and Justification

The rapid growth of industry, transportation, power and construction in Brazil has substantially increased the demand for engineers of all types including highly trained engineers with graduate degrees as technical problems become more sophisticated and as local engineering research develops. This demand has resulted in a corresponding increase in the number of students in engineering programs, particularly in graduate schools, which provide the personnel for ~~work~~ university faculties of engineering. This project applies to the field of engineering education the major objectives of the coordinated United States and Brazilian Government effort in education which is to improve the Brazilian capability to identify the key human resource needs for economic and social progress, prepare feasible action programs directed at meeting such needs and create the staffs and mechanisms to carry out those ~~the~~ programs.

B. Goals and Targets

This project seeks to develop institutions required to meet Brazil's need for highly trained graduate engineers, ~~particular~~ particularly in teaching positions. Specifically, the project is designed to assist in the development of viable postgraduate engineering programs at the Federal University of Rio de Janeiro (UFRJ) and at the Pontifical University of Rio de Janeiro (PUC). During the first years of the project its targets, which were achieved and surpassed, were to enroll and train a minimum number of students. At present the goal is not numbers of students but rather a full-time, well-qualified teaching staff, proportionate to the number of students, who teach and conduct research projects and, to the extent possible, instill good academic ~~procedures~~ procedures and administrative practices. The project seeks to concentrate in the ~~following~~ following fields, which are of high priority to Brazilian economic development: industrial, mechanical, metallurgical, electrical (power production, ~~and~~ transmission and control) and transportation engineering. Moreover, it has sought to amplify its impact on engineering education through extension activities with other engineering schools in Brazil. By the time grant assistance terminates in June 1971, the expectation also is that university-to university relationships will be built up between the Brazilian and American institutions participating in the project, leading to fruitful and self-sustaining exchanges, which are mutually beneficial.

C. General Approach and Plan of Action

There are two ~~main~~ principal forms of U.S. technical assistance: 1) USAID- financed professors, furnished through a contract with the University of Houston, who serve on the graduate engineering teaching staffs of UFRJ and PUC and who give short courses and seminars at these and other engineering schools in Brazil and 2) scholarships for advanced engineering training in the United States, particularly in those areas and at those levels of instruction not available in Brazil. In addition to budget resources provided by the Government of Brazil, which have built the impressive facilities at UFRJ, the graduate engineering program has also benefitted from contributions from several other Brazilian sources including scholarships and equipment furnished by the Coordination of Improvement

of Higher-Level School Personnel (CAPES), the National Research Council (CNPq) and the Technical-Scientific Fund of the National Development Bank (FUNTEC), and research grants offered by Petrobras, Rhodia Brasileira Chemical Company and Shell do Brasil S.A. Additional outside assistance in the form of teaching grants has been offered by the Organization of American States (OAS), the Rockefeller Foundation and the Fulbright Commission.

The level of inputs by the UFRJ and the Brazilian Government, ~~together~~ with outside assistance, has been ~~a~~ adequate so far to meet the goals of the project. Brazilian support for the UFRJ program has grown, as evidenced by the fact that in 1964 more than half its funds came ~~x~~ from foreign sources, mostly USAID, while in 1968 less than a quart of the cost of UFRJ's Coordination of Postgraduate Programs in Engineering (COPPE) was financed abroad. COPPE continues to pay the salaries of its professors who are in training overseas and ~~ensures~~ assures them employment, generally at a higher level, when they return, as virtually all do. In nearly every instance, ~~competent~~ competent counterpart personnel have been assigned to work with the U.S. specialists. PUC, which has a much more modest program, has generally given adequate support to the U.S. technicians there and to its professors in training abroad.

II. SETTING AND ENVIRONMENT

The rapid growth of industry in Brazil during the past fifteen years and the accelerating pace of economic development have created a growing demand for highly qualified engineering specialists. In the period 1960-1965 the percentage of Brazilian engineering students in proportion to the total university population was estimated at 11 per cent, placing Brazil in seventh place in this respect among Latin American nations, behind Colombia, Mexico, Chile, Venezuela, Peru and Argentina. There has been an increase in engineering enrollment in Brazil in ~~recent~~ ^{recent} years (15,680 in 1963 and 37,910 in 1968), but the number of engineers is still inadequate for the needs of the country.

III. STRATEGY

A survey conducted by the OAS in 1962 recommended that assistance in engineering be provided to the University of Brazil in Rio de Janeiro (now UFRJ), which the OAS sponsored in the form of professors for graduate studies in chemical engineering. In 1963 USAID began to collaborate with the UFRJ by providing professors for the chemical engineering program. In 1964 USAID assistance was also extended to PUC, which was initiating a post-graduate program in mechanical engineering. Since that time USAID has also helped UFRJ and PUC to establish programs in the fields of electrical, civil and metallurgical engineering. In 1969 the three parties agreed that further project assistance would be concentrated in the fields of industrial, mechanical, metallurgical, electrical (power production, transmission and control) and transportation engineering, which are ~~now~~ considered of high priority to Brazil's future economic development.

~~Through~~ Through a contract with the University of Houston USAID provides full-time professors to serve on the engineering staffs of UFRJ and PUC, as well as short-term consultants and lecturers. Another form of assistance is training grants for advanced study in the United States for COPPE and PUC professors. The number of ~~part~~ participants has not been large, however, and training projections have been scaled down for th

remainder of the project because of the ~~scarce~~ availability of attractive grants offered by agencies of the Brazilian Government, such as CAPES, CNPq and FUNTEC.

Occasionally, the American professors assigned to COPPE and PUC, as well as the short term consultants and lecturers, give short courses and conduct seminars which are attended by staff members of other Brazilian engineering schools, including the University of Brazil, the Federal Universities of Minas Gerais and Rio Grande ~~do Sul~~ do Sul, the University of São Paulo and the Technical Aeronautical Institute (ITA). These seminars have brought about a degree of coordination and cooperation among those institutions which forms the basis for an extension program whereby COPPE would assist with reforms in the administration and organizational structure and educational content of their engineering programs.

While, for reasons of national sensitivity, prominence is not given to the role which the American ~~professors~~ professors have played in shaping academic and administrative policies and practices, this aspect of the project is real and has been acknowledged informally, particularly by COPPE. There has been receptivity to American administrative and organizational ideas, and many have been adopted. The ~~predominant~~ predominant foreign influence in both postgraduate engineering programs is that of the United States, and the presence of American professors, as well as the training received by many of the Brazilian engineers in the United States, has assisted in bringing about changes which would very likely have been resisted if made part of a formal project commitment.

U.S. assistance has generally been well supported. Not only have COPPE and PUC provided ~~and~~ adequate working facilities and good counterparts, but the leadership of the respective institutions has been dynamic and enthusiastic, particularly at COPPE. The universities, as well as the Brazilian Government, have contributed to these teaching programs by acquiring laboratory equipment and materials and expanding rapidly the number of courses, as well as student enrollment.

USAID assistance to COPPE and PUC complements that provided to the ITA from 1961 to 1967, which established a mechanical engineering department at that institute, and complements U.S. loan assistance to Brazil, particularly in transportation and electric power by providing the kinds of trained ~~personnel~~ personnel needed in these fields.

IV. PLANNED TARGETS, RESULTS AND COMMENTS

Until 1968 the Engineering Education project sought to establish a postgraduate program at COPPE and PUC ~~with a minimum number of scholars. Through December 31, 1968, COPPE granted 85 M.S. degrees. By mid-1969 about 50 additional M.S. degrees were granted. Fifteen students were working on doctorates, with the first degree to be granted before the end of 1969. Most COPPE graduates are teaching at engineering schools throughout Brazil. Virtually all professors at COPPE are full-time staff members.~~

The project target has shifted during the past two years from numbers of students to the expanding requirements of the faculties, particularly in those branches of engineering most ~~important~~ important for Brazilian economic development. The goal now is to provide technical assistance to COPPE and PUC in the development of postgraduate programs in engineering and the improvement of teaching, research and administrative practices, concentrating in the priority fields of industrial, mechanical, ~~and metallurgical,~~ metallurgical, ~~and metallurgical,~~

electrical (power production and transmission and control) and transportation engineering.

A survey in September 1968 by Dr. R. S. Ramalho indicates that the alumni of these programs are having a significant impact on engineering education in Brazil. Dr. Ramalho interviewed 37 alumni teaching in 20 different universities throughout the country, among whom there was a concensus that the graduate course

1. revealed a new teaching philosophy as to lecture content, laboratory work, assignments and examinations,
2. greatly increased their qualifications as professors and their interest in teaching as a full-time activity and
3. increased their dedication to research activities, especially those related to the country's development needs and potential.

While neither PUC nor COPPE can function independently of foreign assistance before 1972 when a number of their professors now in advanced training abroad will complete their studies, this project will accomplish its major objectives by June 1971 when it is scheduled to terminate. The postgraduate engineering programs of both institutions will be firmly established, and new fields of work and higher levels of studies and research will be in the process of development. The project will not only have provided good instruction by the contract professors but will have influenced the manner in which the programs, particularly at COPPE, function in their policies, organization, teaching procedures, student-teacher relationships and research activities. At PUC project assistance will result in the creation of an electrical engineering laboratory and the reformulation of the mechanical and ~~industrial~~ industrial engineering programs; at COPPE in a thermodynamics laboratory, an industrial engineering laboratory and ~~the~~ the reformulation of its industrial and mechanical engineering programs as well. Moreover, the project will have been instrumental in establishing contacts between PUC and COPPE on the one hand and a number of other Brazilian universities with advanced programs in engineering.

Such assistance may be available through university to university programs, international organizations, foreign governments and a USAID loan in support of postgraduate education in Brazil. PUC and COPPE are developing rapidly and assuming important new dimensions and functions. COPPE in particular may well need and merit special assistance in starting new phases of its activities.

V. COURSE OF ACTION

The principal technical element of the project is the four USAID contract professors who fill positions on the staffs of COPPE and PUC. Such assistance will phase out at PUC by mid-1970 and at COPPE by June 1971. Short-term assistance to both institutions will continue through the life of the project, depending on their specific needs. Brazilian professors at COPPE, PUC and other institutions cooperating in the engineering extension program were offered ten scholarships in 1969 for graduate study in the United States, not all of which were utilized. As a result, seven scholarships ~~are~~ been planned for 1970 and again for 1971.

It is anticipated that the University of Houston will continue to serve as the USAID contractor and will recruit qualified ~~xxxx~~ candidates from its own staff and the staffs of other American ~~xxxxxx~~ universities to fill teaching positions at COPPE and PUC. Houston will also recruit ~~xxxx~~ professors for short-term courses and lectures in specific fields of engineering, particularly those designated as priority areas for development, and will assist in identifying and processing candidates for postgraduate studies in the United States.

In addition to teaching grants from the OAS, the Rockefeller Foundation and the Fulbright Commission, COPPE has received assistance in recent years from several other foreign governments - Great Britain, France, the Netherlands, West Germany and the Soviet Union - which have provided professors for its staff. Although the relative importance of U.S. aid to COPPE has decreased as a result, this assistance will continue to be very important and will influence, through the COPPE and PUC programs, engineering education in Brazil.

ELBRICK

NON-CAPITAL PROJECT FUNDING (Obligations in \$000)

Table 1
Page 1 of 2 pages
COUNTRY: BRAZIL

PROP Date:
Original
Rev. N^o:
Project N^o: 512-11-660-263.2

Project Title: Engineering Education

Fiscal Years	Ap	L/G	Total	Cont ^{1/}	Personnel Serv.			Participants		Commodities		Other Costs	
					AID	PASA	Cont	U.S. Agen.	Cont	U.S. Agen.	Cont	U.S. Agen.	Cont
Prior thru Actual FY 69	AG	G	947	854	-	-	644	113	40	-	13	-	137
Operational FY 1970	AG	G	264	205	-	-	148	59	19	-	-	-	38
Budget FY 71	AG	G	74	-	-	-	-	74	-	-	-	-	-
B + 1 FY 72			-										
B + 2 FY 73			-										
B + 3 FY 74			-										
All Subs. Yrs.			-										
Total Life	AG	G	1285	1039	-	-	792	246	59	-	13	-	175

^{1/} Memorandum (nonadd) column

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\$ Equivalent
Exchange rate \$1,00=NCr\$4,00

Project No: 512-11-660-263.2

Fiscal Years	AID-controlled		Other Cash Contribution Cooperating Country	Other Donor Funds (\$ Equiv.)	Food for Freedom Commodities		
	<u>Local Currency</u> U.S. owned	<u>Ctry.</u> owned			<u>Metric Tons</u> (000)	<u>CCC Value & Freight (\$000)</u>	<u>World Market Price (\$000)</u>
Prior thru Actual FY 69		28					
Operational FY 70		60					
Budget FY 71		4					
B + 1 FY 72		-					
B + 2 FY 73		-					
B + 3 FY 74		-					
ALL Subs. Yrs.		-					
Total Life		91					

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ROAD A

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1/ Trust Funds