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Report No. P-4605-PO

MEMORANDUM AND RECOMMENDATION  
OF THE  
PRESIDENT OF THE  
INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT  
TO THE  
EXECUTIVE DIRECTORS  
ON A  
PROPOSED LOAN  
IN AN AMOUNT EQUIVALENT TO US\$32 MILLION  
TO THE  
REPUBLIC OF PORTUGAL  
FOR A  
TECHNOLOGY EDUCATION PROJECT

June 25, 1987

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CURRENCY EQUIVALENTS

Currency Unit = Portuguese Escudo (Esc.)

Calendar Year 1986

US\$ 1 = Esc. 150  
1 Esc. = US\$ 0.0067

March 1987

US\$ 1 = Esc. 150  
1 Esc. = US\$ 0.0067

PORTUGUESE FISCAL YEAR

January - December

School Year

October - June

ABBREVIATIONS AND ACRONYMS

AIP Association of Portuguese Industries  
EC European Community  
INA National Institute of Administration  
INESC Institute for Engineering Systems and Computation  
INIAER National Institute for Agrarian Research and Rural Extension  
INIC National Institute of Scientific Research  
JNICT National Board for Scientific and Technological Research  
LNETI National Laboratory for Engineering and Industrial Technology  
MOE Ministry of Education  
MOL Ministry of Labor  
OECD Organization for Economic Cooperation and Development

REPUBLIC OF PORTUGAL  
TECHNOLOGY EDUCATION PROJECT

Borrower: Republic of Portugal

Amount: US\$32 million

Terms: 15 years including 3 years of grace

Financing Plan:

	Local	Foreign	Total
	----US\$	Millions----	
Government	29.6	15.5	45.1
IBRD	<u>    </u>	<u>32.0</u>	<u>32.0</u>
Total	29.6	47.5	77.1

Economic Rate of Return: N/A

Staff Appraisal Report: Report No. 6617-PO dated June 18, 1987

MEMORANDUM AND RECOMMENDATION OF THE PRESIDENT  
OF THE INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT  
TO THE EXECUTIVE DIRECTORS  
ON A PROPOSED LOAN  
TO THE REPUBLIC OF PORTUGAL  
FOR A TECHNOLOGY EDUCATION PROJECT

1. The following report on a proposed loan to the Republic of Portugal for US\$32 million is submitted for approval. The proposed loan would be on standard IBRD terms and would help finance a Technology Education Project.

2. Background. A major objective of the Government's economic restructuring and development program is to increase the competitiveness of Portuguese industry and agriculture in the world market place and particularly within the EC. To facilitate this process, the Government is attempting to establish a more conducive industrial and financial policy environment, as well as providing the needed infrastructure (both physical and institutional). The shortage of scientifically and technically trained personnel and the low level of technological development have been identified as important constraints to reaching these objectives, inhibiting (i) the development and improvement of industrial production methods; (ii) the establishment of adequate product quality control systems; (iii) the setting up of research and development capacity for new products; (iv) the application of EC regulations for measurements and standards; (v) the improvement of occupational safety and health requirements; and (vi) the enhancement of environmental and pollution control measures. In agriculture, the capacity of the sector to adjust to EC conditions is particularly weak, given the shortage of trained manpower to staff agriculturally-based enterprises, in particular food-processing, and to bring modern farming techniques, including management, to the medium-sized and small farms which are expected to be the mainstay of agricultural renovation.

3. To address these issues, the Government is undertaking a number of programs to improve the content and efficiency of the education system, including a series of projects for manpower development financed in part by the Bank. The Government assigns high priority to human resource development, in particular to the education and training of scientists, technologists and managers, and to establishing a well-equipped modern school system which is capable of developing an efficient labor force. The Government's current programs include activities to enhance the universities' capacities to train and upgrade scientists, engineers, managers and teachers, and modernize and improve the general education system. It has established a network of vocational training centers with EC assistance, and is fostering closer linkages of university research with the evolving technological needs of the industrial and agricultural sectors.

4. Project Objectives. The proposed project would continue the efforts begun under earlier Bank-financed projects to assist Portugal adapt its education and training system to the requirements of a modern economy. Specifically, it would focus on (i) rationalizing and strengthening university-applied research to better meet the needs of industry and agriculture; (ii) expanding polytechnic agricultural education with emphasis on practical skills training; and (iii) introduction of the use of computers in primary and secondary schools.

5. Project Description. The proposed project would improve the relevance and quality of scientific and technological research and training, and of agricultural education by helping to (a) establish three applied research institutes with regional branches (in biotechnology, materials science, and water resources) and two agricultural polytechnic institutes; and (b) strengthen instruction in science, mathematics and language skills in general education, and increase the number of graduates qualified to enter higher scientific and technological studies, by assisting 140 secondary and 30 primary schools to modernize the curricula through the use of computers as instructional tools and for developing computer literacy. The project, to be implemented over seven and a half years, provides funds for training, technical assistance, civil works, furniture, equipment, publications and computer software. The total cost of the project is estimated at US\$77.1 million, with a foreign exchange component of US\$47.5 million (62%). A breakdown of costs and the financing plan are shown in Schedule A. Amounts and methods of procurement and disbursements, and the disbursement schedule are shown in Schedule B. A timetable of key processing events and the status of IBRD operations in Portugal are given in Schedules C and D, respectively. A map is attached (IBRD #14942R5). The Staff Appraisal Report, No. 6617-PO, dated June 18, 1987, is being distributed separately.

6. Rationale for Bank Involvement. The proposed project directly supports Government strategy to modernize its education and training system, and to develop its capacity for applied research required to support the development of the industry and agriculture sectors. The proposed project complements and builds upon earlier Bank assistance in the sector through creation of new programs to upgrade engineers and scientists, and training of technicians and skilled workers for industry and agriculture.

7. Agreed Actions. During negotiations, the Government confirmed its agreement on the following actions: (i) maintain the Project Unit in the Ministry of Education with appropriate staff and authority; (ii) establish a board for each applied research institute, with representation from industry and the universities, and conduct contracted research programs for industry with cost recovery; (iii) provide supplemental orientation seminars for instructors of the agricultural polytechnic institutes; select about 30% of their students from applicants with a farming background; prepare curricula and equipment lists by December 31, 1988; (iv) complete an interim evaluation of the existing pilot phase of introduction of computers in schools by December 31, 1991, review the results with the Bank to guide investments after June 30, 1992, and carry out a final evaluation of this component, to be completed by December 31, 1994, and furnish the results to the Bank by March 31, 1995; and (v) by December 31, 1994, provide the Bank with its proposals for generating funds to maintain and upgrade computer equipment use in schools. The creation of an appropriate management structure for the computer component would be a condition for disbursement of the Bank loan allocated for that component.

8. Justification. The proposed project would make a significant contribution to Portugal's manpower training efforts in support of its

industrial and agricultural restructuring. It would contribute indirectly to the expansion of export-oriented industry and the greater utilization of Portugal's natural resources for agricultural development. Specific benefits would be: (i) consolidating and updating key applied research facilities and increasing the number of qualified researchers trained each year from about 25 to 110; reinforcing research and development linkages with industry and agro-business; and developing links with overseas research institutes to facilitate technology transfer; (ii) increasing the output of graduates from agricultural polytechnic institutes by about 120 per year while strengthening the graduates' farm practice and management skills; and (iii) extending the use of the computer as an instructional aid to 15% of Portugal's secondary schools and a small number of primary schools, to improve the quality of scientific and technical studies.

9. Risks. The principal risk associated with the project's applied research component is that, because of the traditionally academic orientation of the university system, the work of the research institutes would not find practical application in industry and agriculture. The project would reduce this risk by giving industry a prominent role in the determination, management and financing of research programs. There is also a risk that instruction in the agricultural polytechnic institutes would be overly theoretical. To reduce this risk, Ministries of Education and Agriculture would collaborate closely to strengthen the practical orientation of training. The Government would make efforts to orient instructors toward practical application of course content, and would open up admission to students from a farming background. Because of the generally limited experience with the use of computers in mathematics and science teaching and the potentially fundamental changes in teaching practices that are involved, the risks associated with the computer component include lack of teacher and student acceptance, failure to integrate computer use with curricula, and inappropriate software selection and development. These risks would be reduced by establishing management and support services for the scheme, training specialist teachers and subject advisors, phasing the introduction of computers, and carefully evaluating school computer development strategies.

10. Recommendation. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Bank and recommend that the Executive Directors approve the proposed loan.

Barber B. Conable  
President

Attachments

Washington, D.C.  
June 25, 1987

Schedule A

Estimated Project Costs:

	Local	Foreign	Total/a
	-----US\$ Million-----		
<b>A. <u>Applied Research Institutes:</u></b>			
Biotechnical Research Institute	10.9	17.3	28.1
Materials Science Research Institute	1.0	2.8	3.9
Water Resources Research Institute	3.1	4.9	8.0
Sub-Total	<u>15.0</u>	<u>25.0</u>	<u>39.9</u>
<b>B. <u>Agricultural Polytechnic Institutes:</u></b>			
Agricultural Polytechnic Institutes	4.6	5.1	9.7
Agricultural Teacher Training	0.2	1.6	1.8
Agricultural Curriculum Development	0.0	0.1	0.1
Agricultural Planning, Program & Management	0.0	0.1	0.1
Sub-Total	<u>4.8</u>	<u>6.8</u>	<u>11.6</u>
<b>C. <u>Computers in Schools:</u></b>			
Computer Facilities	2.4	8.0	10.3
Curriculum Development and Teacher Training	2.4	0.5	2.9
Evaluation of Computer Use	0.7	0.4	1.1
Sub-Total	<u>5.5</u>	<u>8.8</u>	<u>14.3</u>
Total Baseline Costs	25.2	40.6	65.9
Physical Contingencies	2.5	4.1	6.6
Price Contingencies	<u>1.8</u>	<u>2.8</u>	<u>4.7</u>
<b>TOTAL PROJECT COSTS /b</b>	<b><u>29.6</u></b>	<b><u>47.5</u></b>	<b><u>77.1</u></b>

/a Figures may not add up due to rounding.

/b Total project costs include an estimated US\$2.3 million in identifiable duties and taxes.

Financing Plan:

	Local	Foreign	Total
	-----US\$ Million-----		
Government	29.6	15.5	45.1
IBRD	---	<u>32.0</u>	<u>32.0</u>
Total	<u>29.6</u>	<u>47.5</u>	<u>77.1</u>

Procurement:

Category of Expenditure	-----US\$Million-----			Total or n.a.
	---Procurement Method---			
	ICB	LCB	Other	
Civil Works	16.9	4.5	0.0	21.4
	( 4.4)	( 1.8)	( 0.0)	( 6.2)
Professional Services	0.0	0.0	1.7	1.7
	( 0.0)	( 0.0)	( 1.5)	( 1.5)
Equipment and Furniture	25.0	3.0	2.0	30.0
	( 9.0)	( 1.1)	( 0.7)	(10.8)
Publications and Software	0.0	0.0	2.5	2.5
	( 0.0)	( 0.0)	( 0.9)	( 0.9)
Technical Assistance	0.0	0.0	21.5	21.5
	( 0.0)	( 0.0)	(12.6)	(12.6)
Total	41.9	7.5	27.7	77.1
IBRD financing	(13.4)	( 2.9)	(15.7)	(32.0)

/a Figures in brackets are the respective amounts to be financed by the Bank loan.



Disbursements: /a /b

Category of Expenditure	Amount (US\$ Million)	% of Expenditures to be Financed
Civil works:		
- Biotechnology Component	1.9	20%
- Other Components	3.7	40%
Equipment, furniture, books technical journals and computer software	10.6	100% (foreign) 100% (local-exfactory) and 85% (of total)
Consultants' services, including fellowships:	12.9	100%
Unallocated	<u>2.9</u>	
Total	<u>32.0</u>	

Estimated IBRD Disbursements (in US\$ Million):

	Fiscal Years							
	1988	1989	1990	1991	1992	1993	1994	1995
Annual	2.0	3.2	4.0	5.0	5.4	5.0	4.4	3.0
Cumulative	2.0	5.2	9.2	14.2	19.6	24.6	29.0	32.0

/a A Special Account of \$2.0 million would be established in a financial institution on terms and conditions satisfactory to the Bank.

/b Disbursements for eligible expenditures for contracts under \$150,000 would be made against statements of expenditure.

Schedule C

Timetable of Key Processing Events:

(a) Time taken to prepare:	15 months
(b) Prepared by:	Government
(c) First IBRD mission:	July 1985
(d) Appraisal mission departure:	September 1986
(e) Negotiations:	June 1987
(f) Planned Date of Effectiveness:	October 1987
(g) List of Relevant PCRs and PPARs:	Education I
	June 20, 1985 (PCR)
	April 23, 1987 (draft PPAR)

STATUS OF BANK GROUP OPERATIONS IN PORTUGAL  
(\$ million)

A. STATEMENT OF BANK LOANS /a (as of March 31, 1987)

Loan No.	Year	Borrower	Purpose	Amount (less cancellations)	
				Bank	Undisbursed
Seventeen loans fully disbursed				423.19	-
1793	1980	Republic of Portugal	Education II	35.0	11.7
1853	1980	Republic of Portugal	Forestry	38.0	18.2
1942	1981	Banco de Fomento Nacional	Development Finance	100.0	21.9
2168	1982	Republic of Portugal	Industrial Ener- gy Conservation	18.5	15.9
2175	1982	Republic of Portugal	Tras-os-Montes Rural Development	51.0	26.2
2240	1983	Electricidade de Portugal, EDP	Power VII	84.0	3.1
2263	1983	Republic of Portugal	SMI II	40.3	14.4
2456	1984	Republic of Portugal	Manpower Training & Development	20.0	18.7
2521	1985	Republic of Portugal	Coal Handling Port	66.0	51.7
TOTAL				<u>875.99</u>	<u>181.8</u>
of which has been repaid				<u>282.1</u>	
TOTAL now outstanding				<u>593.89</u>	
Amount sold				42.4	
of which has been repaid				<u>10.8</u>	
TOTAL now held by Bank /b				562.29	
TOTAL undisbursed					<u>181.8</u>

/a The status of projects listed in Part A is described in a separate report on all Bank/IDA financed projects in execution, which is updated twice yearly and circulated to the Executive Directors on April 30 and October 31.

/b Prior to exchange adjustments.















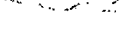



B. STATEMENT OF IFC INVESTMENTS (as of March 31, 1987)

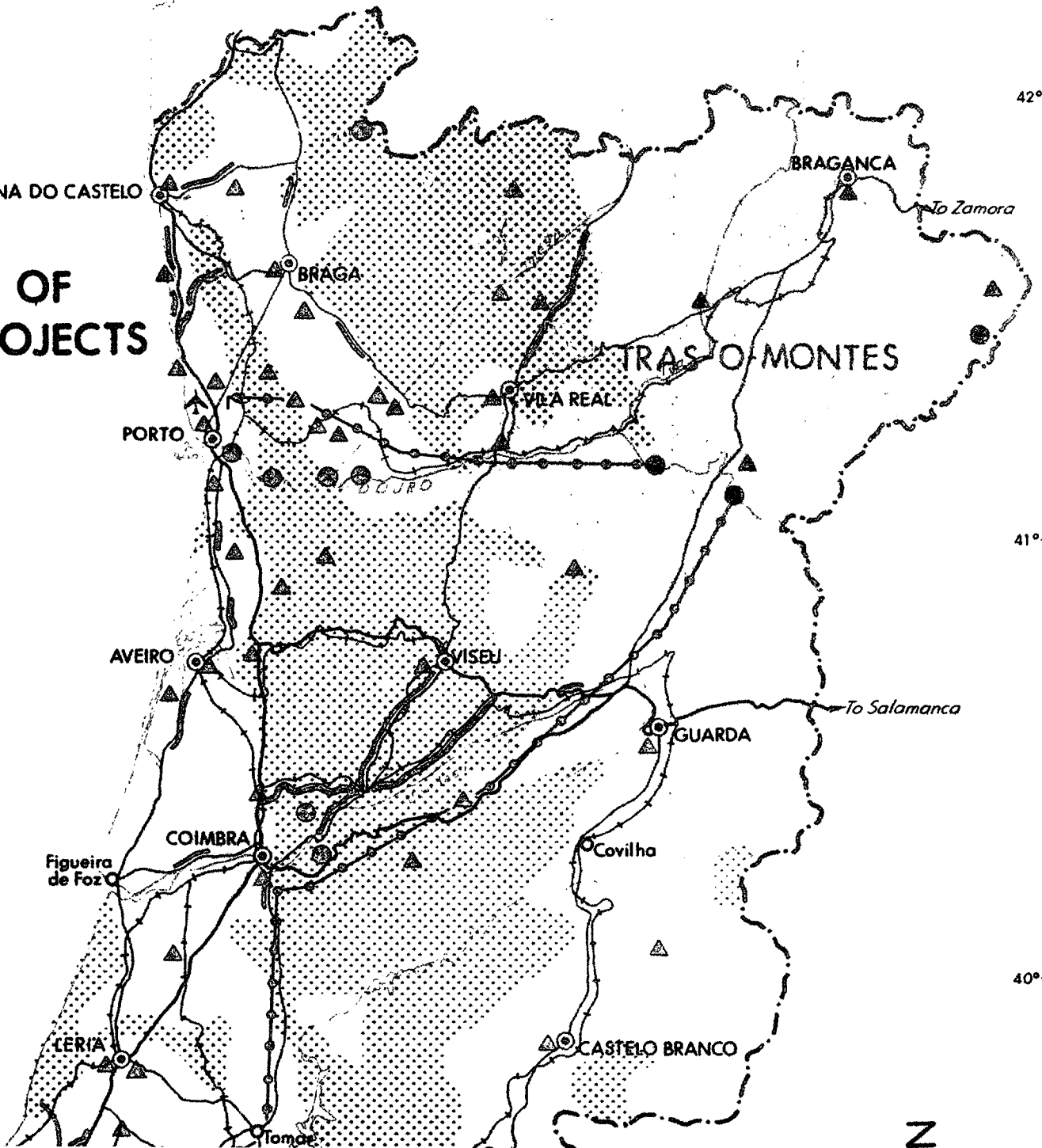
<u>Fiscal Year</u>	<u>Obligor</u>	<u>Type of Business</u>	<u>Loan</u> (in US\$ million)	<u>Equity</u>	<u>Total</u>
1982/85/87	BPI Banco Portugues de Investimento	Development Finance Company	20.0	1.2	21.2
1983/85	Sociedade Portuguesa de Locação Financeira, SARL	Money & Capital Market	12.0	0.7	12.7
TOTAL Gross Commitments /a			32.0	1.9	33.9
Less Cancellations, Terminations, Repayments, Sales			<u>18.1</u>	<u>0.7</u>	<u>18.8</u>
TOTAL Commitments now held by IFC			13.9	1.2	15.1
TOTAL Undisbursed			-	0.2	0.2
Disbursed			<u>13.9</u>	<u>1.0</u>	<u>14.9</u>

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/a Includes participant's portion.

# PORTUGAL DISTRIBUTION OF BANK ASSISTED PROJECTS BY SECTOR

- PROJECTS**
-  Port
  -  Petroleum
  -  Agriculture
  -  Forestry
  -  Education
  -  Highways
  -  Water Supply
  -  Industrial
  -  Power Stations
  -  Transmission Lines
- EXISTING FEATURES**
-  District Capitals
  -  National Capital
  -  Airports
  -  Ports
  -  Rivers
  -  Primary Roads
  -  Secondary Roads
  -  Railways



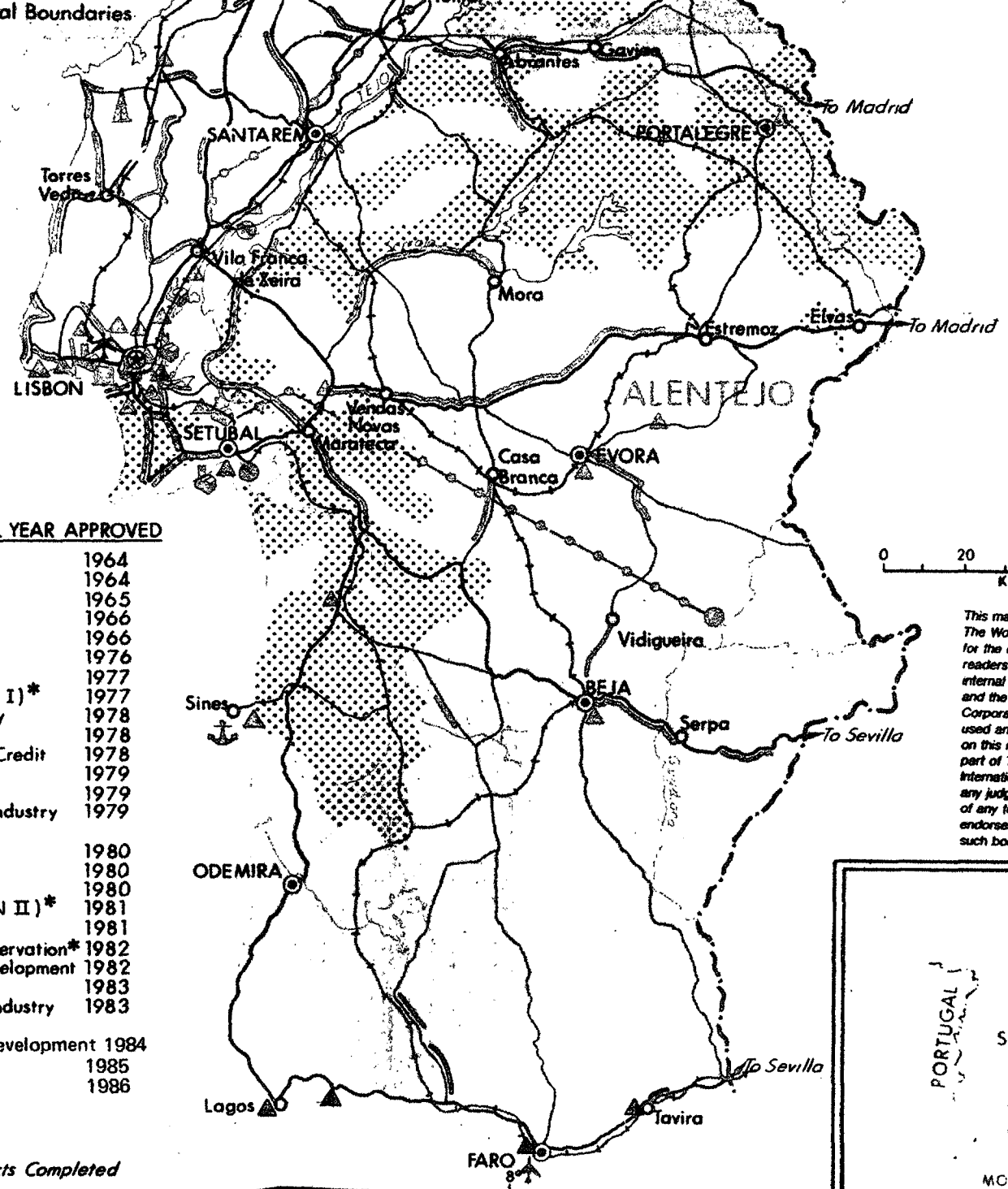
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International Boundaries

39°  
ATLANTIC  
OCEAN

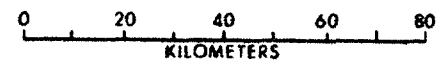
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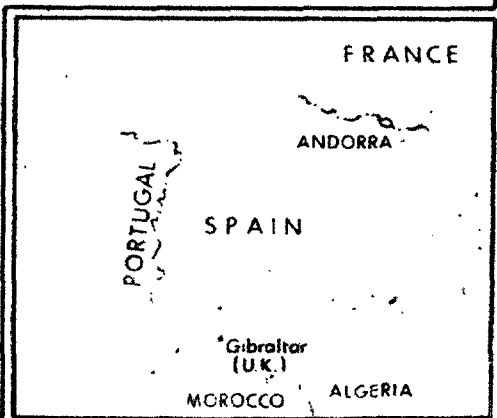
**PROJECT**      **FISCAL YEAR APPROVED**

- ◆ Electric Power I      1964
- ◆ Electric Power II      1964
- ◆ Carregado I Power      1965
- ◆ Carrapatelo I Power      1966
- ◆ Carregado II Power      1966
- ◆ Power VI      1976
- ◆ Highways I      1977
- ◆ Development Finance (BFN I)\*      1977
- ◆ Lisbon Region Water Supply      1978
- ◆ Education I      1978
- ◆ Agricultural and Fisheries Credit      1978
- ◆ Fertilizer Modernization      1979
- ◆ Highways II      1979
- ◆ Small and Medium Scale Industry Development I\*      1979
- ◆ Education II      1980
- ◆ Forestry      1980
- ◆ Mechanical Industries      1980
- ◆ Development Finance (BFN II)\*      1981
- ◆ Petroleum Exploration      1981
- ◆ Industrial Energy and Conservation\*      1982
- ◆ Tras-os-Montes Rural Development      1982
- ◆ Power VII      1983
- ◆ Small and Medium Scale Industry Development II\*      1983
- ◆ Manpower Training and Development      1984
- ◆ Coal Handling Port      1985
- ◆ Housing Finance\*      1986



*This map has been prepared by The World Bank's staff exclusively for the convenience of the readers and is exclusively for the internal use of The World Bank and the International Finance Corporation. The denominations used and the boundaries shown on this map do not imply, on the part of The World Bank and the International Finance Corporation, any judgment on the legal status of any territory or any endorsement or acceptance of such boundaries.*

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\* Countrywide      ◆ Projects Completed

JUNE 1986

IBRD 1492RS