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Dates: 10/1/1974 - 10/15/1974

Series: Correspondence and Files Created for Research Projects in Support of Operations (Operations Policy Files)

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RETURN TO BANK ADMIN. &
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OP - RESEARCH 1972/74 X

RETURN TO BANK ADMIN. &
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POLICY FILES

THIS FILE IS CLOSED AS OF Oct. 15, 1974

FOR FURTHER CORRESPONDENCE PLEASE SEE Vol XI

RECORDS MANAGEMENT SECTION

LL- M.I.T.
~~Co-OP-RESEARCH~~

Messrs. Herman van der Tak, PAS
Ravi Gulhati, ECDDR

October 15, 1974

B. B. King, VPD BBK

MIT Industrial Liaison Program

The attached correspondence is more or less self-explanatory. I would appreciate it if you could let me know whether you feel that the service would be of sufficient value to you to justify (a) the cost and (b) the risk inherent in apparent core support of MIT.

Attachment

BBKing:gm

OFFICE OF THE PRESIDENT

CAMBRIDGE, MASSACHUSETTS 02139

October 2, 1974

Mr. Robert S. McNamara
President
The World Bank
1818 H Street, NW
Washington, DC 20433

Dear Bob:

I understand that Dr. Virgilio Barco spoke to you about the proposal that the World Bank join the MIT Industrial Liaison Program, or the "ILP", as we call it. In addition to Dr. Barco, our people (General Lampert and Robert Hagopian) have talked with Mr. Ernest Stern, Dr. Charles Weiss, and Mr. Jeffrey Balkind. I'd like to offer a few personal observations concerning the ILP, described in the enclosed leaflet.

A proper question is how the World Bank would gain from membership, since many of your staff members already have contacts at MIT; and why the World Bank should be asked to pay the minimum $20,000 in annual support to this Program when MIT might benefit subsequently from other programs with the Bank, such as specific research contracts and individual consulting arrangements.

Several current members of the ILP also have many contacts at MIT and nevertheless profit from membership. About 2,000 separate research projects are underway here. Because individual faculty members are unlikely to know of activities outside their own fields of interest, the ILP Liaison Officer, whose duties are described in the leaflet, has the job of insuring that the member organization is broadly informed on all research activities of interest to the member. Membership would give the World Bank good assurance that it will have effective use of the totality of information available from the Institute. The enclosed "The World Bank and MIT Research", which lists several research programs of mutual interest, documents in an

impressive way the potential in a formal liaison between our two organizations.

The additional services described in the leaflet are equally significant and valuable. For example, the symposia and seminars frequently cover subjects which we believe are of interest to the Bank, such as the enclosed "Emerging Aspects of International Monetary Problems" and "Politics and Economics of Trade with Russia and China".

The Program requires a well-qualified staff and a variety of support services. The funds needed to operate the ILP are substantial and necessitate that member companies be willing to pay for the service, irrespective of any specific research contracts or individual consulting arrangements resulting from a member's participation.

We fully expect to provide a participating member services well worth the annual fee. I hope that the World Bank will join the Program and am confident you would find it a sound investment.

With my warmest regards, I am

Sincerely yours,

Jerome B. Wiesner
President

Enclosures

WORLD BANK OPERATIONS

By Sector And

MIT RESEARCH PROJECTS

Agriculture

4.04.001 Robotics
4.22.010 Sesto San Giovanni: The Transformation of and Italian Suburb

Industry

4.10.005 Multinational Construction Firms and Transfer of Technology
4.10.037 Defining Alternative Strategies for the Sahel-Sudano
4.13.003 International Trade Theory
4.18.022 Energy Requirements for Production of Metals
4.24.001 Problems of Advanced Industrial Societies
4.24.003 Business and Political Links in Black African States
4.29.035 Guidelines for International Enterprises
4.29.036 Japanese Model of Technology Applied to Brazil
4.29.037 Barriers to Innovation in Less Developed Countries
4.29.081 Employment Effects of U.S. Investment: Brazilian Auto Industry
4.29.082 Regulation of Industrial Conflict in Brazil
4.45.014 Technological Development and International Institutions
4.51.016 Industrial Facilities Location

Transportation

4.02.017 Innovative Transportation and Environmental Design
4.10.010 Investment Strategies for Highway Construction
4.10.059 Railroad Network Evaluation
4.10.060 Railroad Service Reliability Project
4.10.061 Airport Access Case Study
4.10.064 Models of Facility Location
4.11.003 Port Design and Analysis Methodology
4.41.011 Operations Research Applied to Transportation Problems

Transportation continued

4.50.002 Urban Transportation in Developing Countries
4.50.003 Air Transportation in Developing Countries
4.50.004 Systems Analysis as an Aid in the Development Process
4.50.005 Standards for Urbanization and Housing Technologies in Kenya
4.50.008 Highway Cost Model
4.51.004 Aggregate Demand Modeling
4.51.017 Urban Goods Movement
4.51.019 Barriers to Innovation in Goods Distribution
4.55.003 Transportation Information Systems
4.55.011 Transportation and Community Values
4.55.013 Transporation Planning Research: State of Israel

Telecommunications

4.13.012 Economics of Television Broadcasting
4.13.013 Allocation of the Electromagnetic Spectrum for Land Mobile Use
4.15.018 Spectrum Management Studies for Land-Mobile Radio
4.24.017 Asian Communications, Economics and Social Change
4.24.032 Telecommunications Policy
4.44.006 Telecommunications Policy Planning
4.45.019 World Communication

Electric Power

4.10.031 Offshore Floating Nuclear Power Station
4.10.038 Requirements for Water and Electric Power in Saudi Arabia
4.16.007 Power System Modeling
4.16.008 Adaptive Modeling and Control for Electric Power Systems
4.18.004 Environmental-Economic Evaluation Models of Energy Systems
4.18.007 Economic-Environmental Tradeoffs in Power System Expansion Planning
4.18.008 Electric Generation System Scheduling and Simulation
4.18.019 High Concentration Solar Energy Collectors
4.20.002 Environmental Impact of Electrical Energy Production

Water Supply and Sewerage

4.10.025 Professional Education in Environmental Management
4.10.039 Analysis of Water Quality Monitoring Programs
4.10.040 Strategies in Water Quality Management
4.10.041 Screening Models for Water Resource Planning
4.10.042 Hydrologic Network Design
4.10.043 Estimation of Hydrologic Parameters
4.10.044 Project Evaluation: Budget Constraints
4.10.045 A Conceptual Model of Continental Water Storage Flux
4.15.036 Wastewater Treatment with High Energy Electrons
4.18.012 Cooling Water Discharge Studies
4.50.001 Technology Transfer for Water Resource Planning

Education

4.19.001 Center for Advanced Engineering Study
4.14.001 Division for Study and Research in Education
4.25.004 Educational Technology

Population Planning

4.24.005 Population Dynamics and Armed Conflict
4.24.006 Political Demography
4.24.007 Internal Migration in India
4.39.175 Fertility Control in Central Africa

Urbanization

4.02.010 Low Cost Housing and Urban Design in Developing Countries
4.02.012 Program in Industrialization of the Housing Sector
4.29.075 A Plan for Urban Renewal
4.41.008 Resource Planning in Urban Public Safety Systems
4.45.007 East African and Ghetto America Economic Development
4.51.015 Equilibrium Model of Urban Location
4.54.004 Urbanization and Unemployment in Indonesia
4.54.009 Housing Technology and the Needs of Developing Countries

Nutrition

4.24.011 International Nutrition Planning
4.24.012 Analysis of Malnutrition Causes
4.39.011 Nutrition and Behavior
4.39.013 Effects of Chronic Malnutrition on Brain Function

Nutrition continued

4.39.014	Effect of Neonatal Diet on Response to Infectious Disease
4.39.015	Nutrition and Development
4.39.065	Nutrition Evaluation of Single-Cell Protein
4.39.086	Endemic Goiter in Latin America
4.39.087	Iron Deficiency Anemian and Work Capacity in Adult Males
4.39.151	Protein Concentrate Made from Squid
4.39.152	Preparation of Canned and Dried Squid Products
4.39.167	Child Nutrition Evaluation Project
4.39.168	International Malnutrition Map
4.39.169	Nutrition, Food Processing and Import Substitution in Chile
4.39.170	Multidisciplinary Analysis of Malnutrition Casuality
4.39.171	Nutrition Planning in Indonesia
4.39.172	Nutrition Planning in Pakistan
4.39.173	Nutritional Status of Population Groups

Others

4.13.014	Latin American Financial Markets
4.13.015	Socialism as a Producers' Economy
4.15.025	Socioeconomic Systems Analysis
4.20.003	International Environmental Control: Pollution from Trace Metals
4.24.002	International Business
4.24.004	Resource Scarcity and Foreign Policy
4.24.008	Social Science Data on India
4.24.009	Psychological Bases of Asian Politics
4.24.010	African Liberation Movements
4.24.022	Social Conflict and Radicalism in Relatively Developed Democracies
4.24.027	Analysis of Global Interdependence
4.24.029	Science and International Relations
4.24.037	Forecasting in Political Analysis
4.29.005	Implications of Alternative International Payment Systems
4.29.011	Research Cooperation in the OECD
4.29.017	Brazilian Development Bank Training and Research
4.29.029	Characteristics of Effective Helping Organizations
4.29.032	Workers' Ownership and Management in Peru
4.29.033	Comparative Effectiveness of Public and Private Enterprises
4.29.068	Sharing Rules for International Joint Ventures
4.40.003	Technical Assistance on the Coastal Zone
4.50.006	Structural-Acoustic Interaction in Water

at the
Massachusetts Institute of Technology

Industrial Liaison Program

With technical advances continuing to occur at accelerated rates, these thoughts are even more applicable today than they were one hundred years ago. It has become increasingly important for industry to keep abreast of areas which, although not of obvious import today, may become of essential importance tomorrow. No longer can a company focus exclusively on one technology or one discipline. Whether in product development considerations, in planning for corporate growth or in manufacturing operations, industrial firms recognize the importance of maintaining an awareness of the "state-of-the-art" in a number of diverse fields. Over the past twenty-five years many organizations have found that access to the "state-of-the-art" in fields of architecture, science, engineering, humanities and management can be effectively achieved through membership in the Industrial Liaison Program.

The quotation on the cover is extracted from ...ct to Incorporate the Massachusetts Institute of Te... ...ology...", Acts and Resolves of the General Court, Act... ...61, Chapter 183, Section 1, Approved April 10, 1861.

In responding to the needs of the participants in the Industrial Liaison Program, MIT offers a variety of services which can be tailored to the interests of individual organizations. These services include:

An Industrial Liaison Officer (ILO), a graduate engineer or scientist whose education and industrial experience closely parallels the principal interests of the member, is assigned to each company. The ILO is responsible for maximizing the benefits received by the company from its relationship with MIT through such activities as:

- Visiting company locations to ascertain the interests and needs of the key technical and management personnel.
- Identifying activities of potential interest to the company.
- Identifying faculty as consultants or faculty to undertake sponsored research.
- Alerting the company to opportunities in areas such as patents and licensing, continuing education, student interaction, etc.
- Responding to requests by the company.

The Directory of Current Research is a compilation of nearly two thousand individual descriptions covering all of the ongoing research activities of MIT's faculty and staff. As they are completed, written reports on projects are made available to the participating companies.

Discussions with Faculty are a most effective means of keeping abreast of current developments. The Industrial Liaison Officer will arrange appointments between individual faculty and staff members and company representatives to discuss activities of mutual interest.

Faculty Visits to Company Locations provide a substantive opportunity f... ...th faculty members and company pers... ...nel to exchange ideas either through discuss...ns in small groups or through a formal ...inar or both.

Industrial Liaison Program Symposia are one-day conferences involving eight to ten faculty, staff or graduate students. Twelve to fifteen symposia are held each year at MIT and remote locations of specific industry concentration. Topics are selected to be of particular and timely interest to participants and span the range of interests of the Institute's faculty, from the traditional fields of engineering and science to economics and management.

Industrial Liaison Program Seminars involve one to three faculty, staff or graduate students in half-day meetings, of which six to eight are held each year, almost always at locations other than MIT. Topics and locations are selected to be of maximum benefit to area companies.

Research Briefings are one- or two-day conferences organized to be of specific benefit to an individual company. The Industrial Liaison Officer works with the company in choosing technical and management topics of interest to the company.

Manuscripts, Reprints, Reports, Thesis Abstracts, and Thesis Digests authored by the Institute's faculty, staff members and students are made available to the participants on a monthly basis. In most cases this information would not be available through any other source. Approximately 50,000 documents are distributed annually through 2500 mailing points within the member organizations.

Library Privileges including inter-library loans are granted to participating companies. Some six hundred library cards are granted annually to individuals in the member companies.

Seminars and Lectures not sponsored by the Industrial Liaison Office but in which members are encouraged to participate are publicized on a weekly basis.

VOP-RESEARCH
CC: OP-EDUCATION

Mr. John Simmons

October 15, 1974

Mats Hultin

Research on the Use of Radio for
Formal and Nonformal Education

I have read Mr. Jamison's letter of September 13 and the attached research outline on the use of "Radio for Formal and Nonformal Education and Development." The topic is of relevance to Bank activities in education and I, therefore, suggest that you request Dean Jamison to approach the appropriate person in the Bank who is primarily responsible for Bank policies in the use of mass media in education and who would be in charge of such a study, if it would materialize; namely, Mr. Shigenari Futagami. He would certainly be willing to review the outline and appraise the proposal's feasibility in the context of our overall operational needs.

MGH/rcm

cc: Messrs. Ballantine, Futagami
T. King

8?59

INCOMING CABLE

IB59 ZY42 (ECE) GENEVE 65 15 1724Z;

OCT 15th 1974

LTF

Distribution: Mr. Ahluwalia

INTERNATIONAL BANK FOR RECONSTRUCTION
AND DEVELOPMENT
1818 H STREET NW
WASHINGTON DC 20433(USA);

MSC 9694 AHLUWALIA FROM VISWANATHAN REYR LETTER SECOND OCTOBER
REDIRECTED TO GENEVA WHERE EYE ATTENDING
STATISTICAL COMMISSION MEETING. AM SURPRISED YOU HAVE NOT RECEIVED
MY LETTER WRITTEN MORE THAN FOUR WEEKS IN REPLY YOUR PROPOSED;
P2;
VISIT BANGKOK 28 OCTOBER . REGRET EYE WILL NOT BE RETURNING BANGKOK
BEFORE TWO NOVEMBER. HOWEVER WILL BE IN NEWYORK NINETEEN TO TWENTYSIX
OCTOBER AND PROPOSE TO VISIT WASHINGTON DURING PERIOD IF YOU
THERE. PLEASE ADVISE ME CARE UN STATISTICAL OFFICE
IF YOU WILL BE IN WASHINGTON DURING PERIOD. YOU;
P3/15;
MAY ALSO DISCUSS RECRUITMENT CONSULTANT IF YOU ARE VISITING
NEWYORK DURING MY STAY THERE;
UNATIONS GENEVA"

COLL 9694" 28"

OD-RESEARCH
(RPO#299)

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

1818 H Street, N.W., Washington, D.C. 20433, U.S.A.

Area Code 202 - Telephone: EXecutive 3-9000 - Cable Address: INTBAFRAD

October 15, 1974

Dra. Anna Luiza Ozorio de Almeida
IPEA
R. Melvin Jones 5 - 29º andar
Rio de Janeiro - GB - Brazil.

Cara Anna Luiza:

Many thanks for your letter (and most intellectually impressive enclosures) of August 23 to Timothy and of September 26 to me which, among other things, displays your charming knack for epistolar Spanish. Your concern for the outcome of my encounter with the Nordertino virus is particularly appreciated. After nearly a month from his initial attack, my Carioca antibodies finally overwhelmed the nasty bug and I am healthy once again. Now let's turn to the more substantive issues raised in your correspondence to us.

1. Payment of your fees and expenses: The bureaucratic tangles underlying your payments' delay are too long and complex to relate here. I have been assured by the man who actually sends out the checks that all the problems have been solved and that it should be in the mail within the next couple of days. I am also told that all the expenses claimed by you, as well as the time spent in Rio preparing the report will be paid for. Please accept our apologies for this outrageous delay.

2. Current state of the pilot survey data: There is now a tape (and corresponding coding sheets and cards) which purportedly contains virtually all the data collected in the questionnaires. We have just received the part coded under Yoni's supervision and are still at the most preliminary stage of trying to figure out the underlying coding scheme.

3. Availability to you of the pilot survey data and of the data from the extensive survey: Our understanding of the agreement we have with SUDENE concerning accessibility of data generated from these joint surveys is that they will be made available in user tape form by SUDENE, at cost, to any "qualified" Brazilian researcher or research institution on request. Since both you and IPEA clearly belong to these categories, there should be no problem in your gaining access to such data as long as the prevailing "rules-of-the-game" are not changed. We can only assure you that the only changes to which we would agree on this matter would be to liberalize the accessibility to any such data.

Unfortunately, however, we are not in a position to "assure" you that future events or decisions quite out of your control will not in fact foreclose the availability of data to you, or anyone else, ourselves included. Given the nature of these projects, I would suggest that any such assurances should be sought from SUDENE and possibly, IBGE.

4. Your participation in preparing the occupational part of a precoded questionnaire in December 1974.* While we would enthusiastically support your participation in this or any other aspect of the research effort, it is important to bear in mind that SUDENE is and would be the (at least) "senior partner" of the project. Consequently, the participation of any non-Bank staff member would have to be approved by them. A fortiori, we are in no position to "assure" you that your "...suggestions for the survey's occupational information as indicated on pp.52-55 of the Report (will be necessarily adopted)". For that matter, and for the reasons stated above, we are even unable to "assure" ourselves that our own suggestions will be so adopted. In any case, we can't think of any reason why SUDENE would oppose your participation in the design of the questionnaire (or in any other phase of the project) and we feel confident that, when the appropriate time comes, you will be quite successful in persuading the appropriate SUDENE officials to incorporate your suggestions in the design of the definitive questionnaires. As to your success in persuading us, our confidence reaches the level of virtual certainty.

With regard to the timing of your input into the design of the questionnaire, however, the situation is somewhat less certain due to some recent events affecting, among other things, the schedule of the major survey. These, in case you are not yet aware of them, are, in a nutshell, that our departmental counterpart at SUDENE has been shifted so that it would now be the DA (Agriculture) instead of the DRH (Human Resources). This is bound to introduce delays in the scheduling of all phases of the project. Under optimistic assumptions, I would return to Recife in late November to draw up preliminary terms of reference in conjunction with a new Division at the DA, currently in the process of being formed, which would be responsible for monitoring the SUDENE/IBRD research projects. Thus, it is highly doubtful that the final stages of the design of the questionaires (which to a large extent would depend on the definitive terms of reference) could be undertaken during December 1974. It seems only fair to warn you that in my opinion a delay of six months or more in the initiation of the field work (to, say, around June-July 1975) is distinctly possible.

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* In your letter (to Timothy), this data appears as "1975", which I assume is a typo.

5. Can you count on us for funds to ensure you of all necessary information concerning the pilot project? In view of the constraints on our budget for this research effort relative to those binding the (McGroevey) IPPA program, the consensus here in Washington is that you should try to get all the funds you need from the latter source. Should by some unexpected quirk you were to fail in securing them from either IPPA or the Ford Foundation, you may count on us for support of up to $1,500 for this purpose.

Please inform Claudio and Simon of the slippage in the original schedule of my trip to Brazil and for the project as a whole. Please let me know if this letter has failed to clarify any of the issues raised in your letters, by collect phone call, if appropriate (202-477-2787). Otherwise, I look forward to seeing you in Rio during late November.

Um abraço,

Ricardo

Ricardo J. Moran

cc: Timothy King

RMoran:bnd

Mr. B. B. King, Research Advisor, VPD October 14, 1974

Ernest Stern, Director, Development Policy

MIT Industrial Liaison Program

The attached proposal was taken up with me in my earlier incarnation as Research Advisor. I am therefore passing it along to you for action.

MIT has an Industrial Liaison Program which, as I understand it, consists of providing members (usually U.S. corporations) with information on research conducted at MIT and of seminars on research results and topical matters. After the presentation of our research paper to the Board, Dr. Barco, who is a very active alumnus of MIT, suggested a mutuality of research interests. This led to the meeting with Lampert and Kayopian referred to in the letter.

While MIT obviously has many research projects which will be of interest to different parts of the Bank, it has many which are irrelevant. Moreover, we have many contacts with MIT. It is therefore not clear how much we would benefit from such a program.

If the Bank were to make effective use of the program, someone would have to take care of disseminating the MIT material to the right offices. There is also the cost - $20,000 - which is not budgeted for.

In view of these factors, I have been slow to pursue the offer and have talked about the possibility of a free trial year. I do not think that Mr. McNamara has views either way.

Attachment

bcc: Mr. Chenery
MStern/lm

Record Removal Notice

The World Bank Group Archives & Records Management

File Title	Barcode No.
Operations - Research 1972 / 1974 Correspondence - Volume 10	30045549

Document Date	Document Type
14 October, 1974	Letter

Correspondents / Participants
To: Dr. Mohiddin Alamgir
From: Shankar N. Acharya

Subject / Title
Work on research project on rural saving and investment

Exception(s)
Personal Information

Additional Comments

The item(s) identified above has/have been removed in accordance with The World Bank Policy on Access to Information or other disclosure policies of the World Bank Group.

Withdrawn by	Date
Sherrine M. Thompson	December 28, 2017

OP-RESEARCH
(RPO # 277)

Mr. Hans Pollan

October 14, 1974

Einar Sekse

RPO 277: Financing the Development of Small-Scale Industries

1. The following comments are advanced in response to your request on possible operational implications of the above study.

2. The study does not really bring out anything new but it does present in a systematic fashion the familiar problems the small-scale industries (SSIs) face and the reasons for their neglect, and suggests an approach to alleviate their blight. The study's recommendations make sense.

3. The underlying premise is that support to SSIs is desirable because of the significant economic and social benefits to be derived. Specifically, the emphasis on the institution buiing role of the WBG is well placed. The suggestion that loans should be also extended to activities such as construction, transportation, semi-industrial repair shops, is in the right direction. Since in terms of size and sophistication SSIs range from handicrafts to modern small manufacturing enterprises, it may indeed be advisable for the WBG to single out particular groups on which to concentrate. To a large extent this would be determined by the extent to which the proposed financial intermediary can provide concurrently technical assistance either itself or in association with a specialized agency. Also, since each type of financial intermediary which can conceivably be used to channel WBG funds (specialized institution, dfc "window", commercial bank) has advantages and disadvantages, it would be reasonable that the decision be taken after a thorough review by the mission of the specific conditions prevailing in the country and not on an a priori basis.

4. To intensify the WBG's lending for the support and promotion of SSIs (broadly conceived), we feel that the following steps should be taken:

(a) The role (actual and potential) of the SSIs in a particular country's economic development should be ascertained, even in broad terms. In this respect, statistical information regarding the size, sectoral and geographic distribution of SSIs, contribution to GNP, employment, etc., should be compiled.

(b) The Government's degree of commitment (or willingness) to support SSIs, should be established.

(c) The available institutional arrangements (financial, technical assistance) to support SSIs should be reviewed.

(d) The Government's existing policies and support toward SSIs as well as their effectiveness and possible shortcomings should be examined.

5. To the extent that our knowledge of the SSIs in a country is scanty, this exploratory task should preferably be undertaken by an economic or industrial sector mission, with support from DFC or ECD staff. If it can be determined (by a desk study if information is already available or from the mission's findings) that there is scope for lending to SSIs, a sector mission should be mounted by the IC & DFC Division to identify/pre-appraise the project, possibly with support from other Departments.

6. Despite the peculiarities of SSI financing, and provided we have no fixed a priori preferences regarding the financial intermediary through which the funds would have to be channelled 1/, we anticipate no insurmountable difficulties in case of involvement. Major issues calling for protracted effort will most likely be in the areas of organizing the technical assistance component and getting the Government to set up (or reorganize agencies with scattered responsibilities for SSIs) a centralized unit and to bring about the necessary changes in its existing policies to end possible discrimination against SSIs. In the case of export-oriented SSIs, establishing and operating an efficient trading enterprise on a cooperative basis to ensure quality control, acceptable to the importers' size of orders, shipments of economical size, timely delivery, etc., may also prove difficult. Solutions to these and many other problems that are certain to arise will have to be worked out on a case-by-case basis. The existing policy framework of the Bank is broad enough to conveniently accommodate innovative arrangements in SSI financing.

7. Participation of staff from the Economics of Industry Division in our missions should be mutually beneficial and could lead to the identification and greater in-depth analysis of particular issues common to many SSI lending operations.

GManiatis/ESekse:ms

1/ In other words, we should approach the matter with an open mind, realizing that a local DFC, for instance, may not necessarily be the proper channel and that, say, a commercial bank may do a better job.

BA&P O.P. Research (320)

Mr. E. P. Holland October 14, 1974

C. G. Harral

Traffic Restraint Study, Terms of Reference for Mission to Singapore, October/November 1974

1. You will go to Singapore for approximately two weeks, primarily to coordinate work that is under way and to develop detailed plans for further stages of the Traffic Restraint Study. You will go via the United Kingdom in order to meet with staff members of the Transportation and Road Research Laboratory at Crowthorne and get information and advice on the technique of observing license numbers for measurements of journey speeds, traffic volumes, etc., for use in the Singapore study. Between the U.K. and Singapore, you will stop for a day in Istanbul to brief members of the Urban Transport and Land Use Modeling (UTLUM) study team in the Istanbul Master Plan Bureau (MPB) on this week's discussions in Washington with representatives of Jamieson, MacKay, and Partners regarding the Phase II Modeling and to relay any other important communications concerning the UTLUM study.

2. In Singapore, you will confer with Bruno Wildermuth and staff of Survey Research Singapore concerning the household surveys which will presumably be under way by that time, and concerning a more complete definition of the business impact survey, also to be conducted by SRS later on. You will also work with Mr. Wildermuth on arrangements for observations of travel speeds, traffic flows, composition, and other data collection activities. You will discuss with Lim Leong Geok and Pok Sheung Foo the contributions of government agencies to the study.

3. You will discuss with officials the possible role of Singapore in the OECD conference planned for the summer of 1975 on traffic restraint measures, where it has been suggested that the Singapore Government and the Bank make complementary presentations. The outcome of these discussions should be summarized in a Telex to Mr. Dunkerley and Mr. Harral.

4. You will also make arrangements for Mr. Penalosa and Miss Gibson of the United Nations to meet appropriate government officials to discuss Singapore's possible participation in the Habitat conference in 1976.

5. Returning from Singapore, you will stop for about a week in Istanbul, in order to carry out further talks with the UTLUM group about progress of their study, and to give particular attention to progress in the MPB on evaluation of the Phase I Master Plan model runs and the choice of further alternatives for testing with the Phase I model.

6. On return, you will submit a back-to-office report.

EPH

EPHolland:mp

~~To be~~ Cleared with and cc: Messrs. McCulloch, Amin-Arsala, Park (in substance)

cc: Messrs. Dunkerley, Churchill, Watson

O.P. Research (R.P.O 308)

Form No. 27
(3-70)

INTERNATIONAL DEVELOPMENT ASSOCIATION | INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT | INTERNATIONAL FINANCE CORPORATION

OUTGOING WIRE

TO: T. Viswanathan
UNATIONS
Geneva

DATE: October 14, 1974

CLASS OF SERVICE: LT

COUNTRY: Switzerland

TEXT:
Cable No.:

RECEIVED YOURLET DATED OCTOBER ONE AND SUBSEQUENTLY CABLE FROM ROY SMITH INDICATING VISARIA UNACCEPTABLE AND REQUESTING RECONSIDERATION CANDIDATES FOR JOINT INCOME DISTRIBUTION PROJECT STOP SUGGEST WE MEET WASHINGTON FOR REVIEW OF VISARIA AND NARAPALASINGHAM QUALIFICATIONS FOR PROJECT STOP PLEASE CABLE IF YOU CAN VISIT WASHINGTON OCTOBER TWENTYTWO STOP REGARDS STOP

AHLUWALIA

NOT TO BE TRANSMITTED

AUTHORIZED BY: Montek Ahluwalia

NAME: Montek S. Ahluwalia, DRCID Chief x5622

DEPT.: Development Research Center

SIGNATURE _____
(SIGNATURE OF INDIVIDUAL AUTHORIZED TO APPROVE)

REFERENCE:

ORIGINAL (File Copy)

(IMPORTANT: See Secretaries Guide for preparing form)

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Checked for Dispatch: _____

Oct 14 10 32 PM 1974

COMMUNICATIONS

P. Research
(R.P. of 312)

PROM

October 14, 1974

Mr. P. Santema
Director
WHO International Reference Center
for Community Water Supply
13 Parkweg
THE HAGUE
Netherlands

Dear Mr. Santema:

I regret the delay in replying to Mr. van Damme's letter of August 9 but as I explained during our meeting in Brighton, England, I was proceeding to Geneva and following meetings there, taking some vacation so it is not until now that I am able to respond.

I should like to confirm that we are agreeable to proceeding with the project along the lines generally set forth in the Terms of Reference referred to in recent correspondence. Since the Terms of Reference were rather hurriedly prepared, I am in the process of having these revised and will enclose a copy with the Agreement, which is also under preparation. I can assure you now that there will be no major changes from the draft which I sent you. I do propose to elaborate a little on the details of some of the data in order to better answer questions of the type that Mr. DeVlieger raised during our meeting.

As a result of my conversation since return to the Bank, there appears to be only one outstanding problem which needs to be clarified before an agreement can be signed. This concerns the total cost and the number of countries to be visited as a part of the work to be undertaken. In my first letter to you I indicated that I was going to the Research Committee for a project which I had estimated at around $20,000. In my letter of July 26 to Mr. van Damme, commenting upon his cost estimates as presented in his letter of July 19, an error occurred in my letter in that I used a figure of $25,000 as the amount which our Research Committee had approved. The figure approved was the same as I had requested, namely $20,000. If to this amount were added the $10,000 which you have suggested might be contributed by IRC, the total amount available would be $30,000, somewhat less than the amount which I believe we both agree is necessary to carry out the study. I have raised the question with our Research

Committee and they have suggested that we give a clear justification as to the need for an additional amount. It has been further suggested that in order to establish accurately such justification, and in order to permit the project to proceed as rapidly as possible, work be initiated as soon as you are ready on the literature review, together with letters of inquiry to various WHO field engineers and others. This should lead to an identification of the countries to be visited. Knowing what these countries are and the extent of travel that will be required, a fairly accurate cost figure can then be established for the project. I would then have a basis for requesting a supplement, if necessary. For purposes of further explorations in the Bank, could you give me your estimate of the fee to be paid to the consultant and the per diem costs expected during the field work?

In summary, subject to your concurrence, I am suggesting that you might immediately proceed with the literature review together with the individual inquiries necessary to establish the countries to be visited. Once this has been done I would establish the total cost of the studies and mutually agree to the lump sum to be inserted in the Formal Agreement.

I would appreciate having your comments on the foregoing and whether you think it is possible to postpone for a few weeks the signing of the Final Agreement until we see what the best estimate of the total cost may be. As I indicated to you in my conversations and in our correspondence, we would prefer to enter into a lump sum contract covering all of the work and leaving it to IRC to make all the arrangements and to carry the responsibility of seeing the assignment through to completion.

I will forward to you as soon as available a draft of the Agreement and of the revised Terms of Reference.

Please accept my very best regards.

Very truly yours,

Harold R. Shipman
Water Supply Advisor
Public Utilities Department

HRShipman:cfa

Cleared with and cc: Mr. Rovani

cc: Messrs. D.C. Rao
Saunders
Miss P. Peter

O.P. Research

Mr. S. C. Panickaveetil, P & B

October 14, 1974

Mona Hazzah, VPD MH

Outside Financing of Research Projects

The following is a list of selected projects with outside financing:

RPO 226 - Substitution of Labor & Equipment in Civil Works

Projected cost FY74-75

	($'000)
Bank	580.0
US	400.0
Germany	400.0
Japan	200.0
UK	400.0
Canada	190.0
Nordic countries (Sweden, Finland, Norway, Denmark)	300.0

RPO 227 - Highway Design Study - Phase II

FY75 estimates

Bank	50.0
UNDP	N/A
Brazil	N/A
India	N/A
CIDA*	N/A

*Canadian International Development Association

RPO 268 - International Comparison Project

FY75 Estimates

Bank	90.0
USAID	40.0
Germany	20.0
Netherlands	15.0
UK & Economic Commission for Europe (EEC)	10.0

RPO 302 - Population Growth & Rural Poverty

FY75 estimates

Bank	22.0
Population Council	25.5

RPO 320 - Traffic Restraint in Singapore

	($'000)
Bank	110.0
UNEP	55.8

Attached you will find a copy of the accounts procedure for RPO 226 - Substitution of Labor and Equipment in Civil Works.

See memo Jan. 9, 1974, Mitchell & Ruddy - RPO 226.

Attachment

R. Research
(Solar-Energy)

Mr. Peter Engelmann (Transportation and Urban Projects)
Efrain Friedmann (Public Utilities)

October 14, 1974

Research on Solar/Energy Mariculture

I refer to your memo of October 4 on the above subject. Since the energy crisis we have received several enquiries - some sent directly to Mr. McNamara - regarding possible Bank support for new ideas in coping with the problems. Our position has been that we generally expect R & D on these matters to be financed by commercial or public institutions of the industrial countries. We appreciate being informed of progress made, but we can only recommend them as investments to LDCs when they have been demonstrated as feasible in the technical and economic sense. We may, however, sponsor or help to develop some research in very specific instances where mainly or only LDCs might be interested or benefited and no sources of funds may be expected to be forthcoming from the advanced countries without some special action from us and other development institutions. As I understand it this would not be the case for the project referred to in your memo. I do not think we need to pursue this beyond the interesting abstract which you sent me.

Cleared with and cc: Mr. Rovani
cc: Mr. H.N. Graves
Mr. Weiss

EF:jr

O.P. Research

Mr. W. Tims, EPDDR

October 14, 1974

B. B. King, VPD

German Research Institutions

I recently visited two institutions which are interested in the work of your department in several ways. It might be worth considering a visit to one of them by Joe Saxe or Bob McPheeters, next time they are in Europe. Details follow:

HWWA

Its full name now is HWWA - Institut fur Wirtschaftsforschung. Its name has been changed in order to get rid of the "library" image. The WWA, of course, stands for Welt Wirtschafts Archiv. It still maintains a large library which is the depository for the UN, FAO, GATT and the EEC. It also translates Finance and Development into German.

The organization is shown in Attachment 1. I saw three people from Division II: Holthus, Scharrer and Menck. The latter was a substitute for Kebschull, who was away in Indonesia, where the Institute has a regional planning project in North Sumatra. They are particularly interested in export promotion in this project and generally, as befits an institute in Hamburg.

However, the section which has a particular interest in the Bank's work is Scharrer's. He is particularly interested in capital flows, especially private investment and the Euro-currency market. He has written a collaborative book on private direct investment flows, which will be kept up to date so far as the numbers are concerned. I expect to get this in the mail some time. He would be interested in knowing more about the Bank's sources of information especially on Euro-bonds and Euro-credits.

DIW

The Deutsches Institut fur Wirtschaftsforschung has also changed its name as can be seen from Attachment 2 on its organization structure. It presumably is trying to get rid of the "konjunktur" image. As can be seen from this attachment, the section on developing countries is a very small part of the Institution, but, presumably, it is able to draw on the particular expertise of other departments in

social accounting, input and output analysis and the like. One point of common interest is possible collaboration with the ICP, about which I have written a separate memorandum to Elinor Yudin (October 11).

Other matters of interest to them are referred to in copies of two letters from Schultz to you which are attached, and a copy of a routing slip from Leoni which I also attach. I have a copy of the paper referred to in Schultz's letter of May 9, in case you need it. I explained to him that at the time he sent you the letter, you were submerged in oil and subsequently had been on leave. I think the question whether they should be encouraged to publish the input/output tables they have collected deserves an answer. All they seem to want to have is a word of encouragement, because that might enable the powers that be to authorize it.

The questions which crop up in Schultz's letters about a socio-economic data bank are related to the routing slip, which was in fact sent to Hans Bokermann. He is the person responsible for preparing such information, which is then used in Bonn.1/ They had considered setting up their own data bank, but rather sensibly, had waited to see if they could not use somebody else's. It would be helpful if Bob McPheeters could in some way indicate the state of play to Bokermann, who has been faced with a certain non-automaticity since March 1973.

It is of some interest that the Statistiches Bundesamt in Wiesbaden prepares a voluminous series of country statistical reports, of which I expect to get a sample in the mail. However, Bonn relies on the DIW to produce statistics which are comparable across countries. Somehow that has a ring of familiarity.

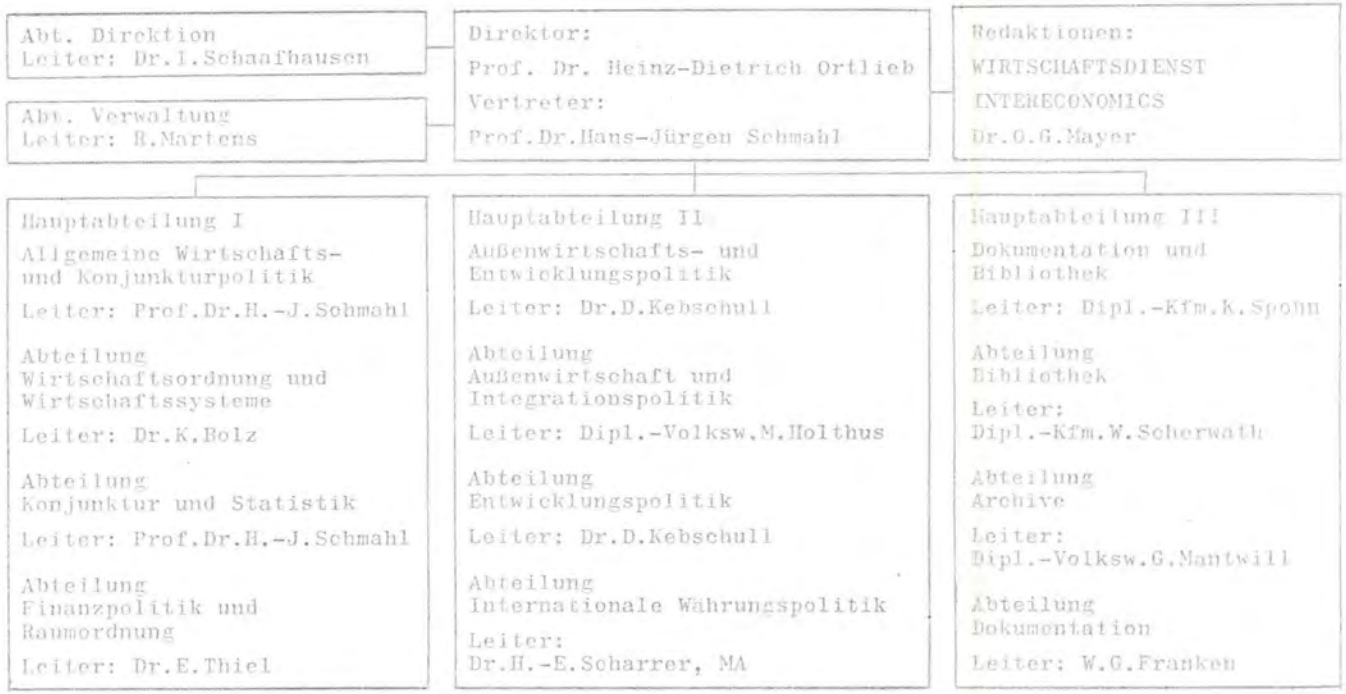
1/ Examples of what they have been preparing are in recent copies of the Institute's Economic Bulletin (in English) which I have.

cc: Messrs. McPheeters
Saxe

BBKing:gm

Attachments

Attachment 1



Freie wissenschaftliche Mitarbeiter: Prof.Dr.J.Feske, Prof.Dr.C.Kapferer, Prof.Dr.H.Sanmann

THE GERMAN INSTITUTE OF ECONOMIC RESEARCH

(INSTITUTE OF TRADE-CYCLE RESEARCH)
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Telex: 01 83 247 diwbl

President
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Executive Secretary
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Dr.Siegfried Schultz

Dr.Wouter T i m s
Deputy Director, Economic
Analysis and Projections Dept.
I B R D
1818 H St., N.W.
Washington, D.C. 20433, USA

August 6, 1974 /K.

Dear Dr.Tims,

Some time ago I tried to contact you to ask for some information on the availability of data from your socio-economic data bank. When I wrote to you, I omitted to mention that our Institute is in charge of establishing a similar, though smaller data bank for the Federal Ministry of Economic Co-operation in Bonn. This bank will comprise three segments: I.Balance of Payments as well as commitments and disbursements of assistance; II. National accounts; III. Socio-economic data incl.employment. Since the establishment of the bank should be completed this fall, I wonder whether the data series requested in my letter of May 9 can be made available to us.

At the same time, we would be very grateful indeed if you could let us know your feelings as regards the proposed compilation of recent input-output tables from LDC's as outlined in the same letter.

We are sorry to cause this extra work for you. However, we would greatly appreciate your assistance in both matters.

Sincerely yours,

K.

Dr.Siegfried Schultz

Dr.Wouter T i m s,
Deputy Director, Economic Analysis
and Projections Department
IBRD
1818 H St., N.W.
Washington, D.C. 20433, USA

May 9, 1974

Dear Dr.Tims,

About a year ago, you and Dr. Stern helped me with some valuable details on Pakistan input-output tables I was working with.

To give you an idea of the kind of work we are doing at the Institute with such tables from developing countries, I am sending you - under separate cover - a copy of the paper which I presented last month at the Input-Output Conference in Vienna. In this study attention was focused on a sample of Asian countries. This approach of identifying key sectors empirically on the basis of input-output data will be extended to other developing regions.

As we faced some difficulties in obtaining these tables, we felt that other parties might be interested in utilizing these data as well. For this reason, we are considering to publish the substantial stock of tables which we have collected by now (for more than 40 developing countries around 70 tables, dated between 1960 and 1970).

During the Vienna conference we were encouraged to stick to this idea by Prof.Ghosh and others who do know how troublesome it generally is to get hold of these data, particularly for comparative analyses. I also discussed the subject with Prof.A.P.Carter, now at Brandeis: First, to get her reaction to this planned enterprise and, second, to ask her for advice as to some support of the project.

In this connection she mentioned the World Bank and your name.

What we are wondering is whether the IBRD would be in favor of such a project and willing to sponsor it in one way or the other. Essentially, we are planning a compilation of input-output tables which - after their individual features are pointed out briefly - could be reproduced as computer print-outs. This should be done on two levels of aggregation: (a) in full - but differing - detail of the original version and (b) at a uniformly maintained degree of (dis)aggregation, thus making the tables comparable in this respect. For your convenience, I am enclosing a sketchy outline of the planned contents. We would very much like to learn the World Bank's view in this matter.

At the same time, I am bringing up another subject: I understand the socio-economic data bank of the IBRD is in the competence of your department. In fact, last June we obtained from you a set of print-outs pertaining to the items 202, 71, 711, and 725 of the indicator code. I wonder whether the data for more indicators are available now. At the moment, I would be particularly interested in the data for the labor force - total and by sector (i.e. code number 041 through 0528) - as well as the sectoral employment figures (061-0628) and the capital-output ratios (701). We would appreciate it very much if you could let us know when these data will be available.

Many thanks in advance for your help. With best regards,

Sincerely yours,

P.S.: Mr.Petersen just reminds me that he would be interested in an updated print-out for the GDP at constant market prices (indicator 202).

FORM No. 75
(2-60)

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

INTERNATIONAL FINANCE CORPORATION

INTERNATIONAL DEVELOPMENT ASSOCIATION

ROUTING SLIP	Date March 19, 1973
NAME	ROOM NO.
Deutsches Institut für	
Wirtschaftsforschung, 1 Berlin 33	
Königin-Luise-Str. 5	
Germany/West	
Hans Bokermann	

	To Handle		Note and File
	Appropriate Disposition		Note and Return
	Approval		Prepare Reply
	Comment		Per Our Conversation
	Full Report		Recommendation
XX	Information		Signature
	Initial		Send On

REMARKS

You will find attached a set of social indicators data prepared up to now by our Division. In the future, a copy of each data sheet will be automatically sent to your office.

From A. Leoni D-347

a P. Research

Mr. B. King

October 11, 1974

Jean Waelbroeck

Takayama Research Proposal

I attach hereto the research proposal submitted by Takayama in response to my telephone conversation with him. My feeling is that Takayama has taken full account of our wishes; he even goes beyond what we thought we could ask him in proposing not only to estimate equations, but also to solve the resulting model; such a model could of course be taken over on the Bank computers if results are felt to be sufficiently useful. The model would be solved using a Newton Raphson technique, which is inherently more powerful than the quadratic programming approach of the Ford proposal, whose only advantages are novelty and theoretical elegance. The Newton Raphson, in particular, does not require the clumsy trial and error linearization described by Takayama in presenting his wheat model at the Bank. The other major improvement in the proposal is that supply functions would reflect fertilizer supplies and agricultural investment and not only prices. This is of course important if the model is to be used for long-term policy evaluation.

My reservation would be in fact that Takayama is proposing too much in proposing to construct a grain, soybean, and animal model for 16 regions. He feels however that he can produce these results because he has been able to recruit a key member of a Japanese team which has just completed a large similar study for the Japanese Government.

I am personally in favor of supporting the proposal. There are two points to which I would like to call attention however:

(a) some provision should be made explicitly for contact between the Takayama group and IBRD while the project is under way. This is indispensable if we are really to be able to make use of the study;

(b) it should be possible to arrange for the balance of $20,000 which Takayama plans to spend in the second year to be imputed to Mr. McNamara's special fund.

Attachment
JWaelbroeck:aws
cc: Mr. B. Balassa
Mr. S. Singh

Research

See List below October 10, 1974

A.K.

Attila Karaosmanoglu, Chief Economist, EMENA

Regional Study of International Migration

Attached is a preliminary outline of a Regional study of international migration which has been prepared by Mr. Colaço (who will co-ordinate the study) and is circulated for comments regarding the content of the study and also the proposed work program.

The economic significance of migration from countries in Southern Europe and the Mediterranean Basin to Western Europe is well recognised. Recent economic events, combined with the social implications of large transfers of labor have, however, in recent months led the major labor-importing countries of Western Europe to re-consider their immigration policies. Obviously, if Western European countries should reduce immigration, or worse still if they should reduce the number of foreign workers within their boundaries, this would have serious economic and social consequences for the labor-exporting countries. Accordingly, it was considered desirable to investigate systematically the changes which have occurred in the immigration policies of Western European countries, and what their implications might be both in the short-term (12 to 24 months) and in the longer-run for labor movements, workers' remittances, and re-patriation of savings.

Recent economic events and the prospects for peace in the Middle East now also attach great importance to an analysis of movements of labor within that geographic area. The Middle East could now be characterized as an area with a large surplus of capital where, because of constraints imposed by politics, language and culture, economic development might be constrained by the available supply of skilled man-power within the area.

Relatively little is known at the present time regarding both the quantity and quality of the labor force in the Middle East, and even less is known about the manpower implications of the expanded investment programs that are being advanced by many of the countries in the area. It is therefore proposed that as a part of the regular economic work of the Region, a systematic effort be undertaken to collect and up-date information regarding labor movements, future manpower requirements, workers' remittances and re-patriation of savings.

The above ideas and their implications for the economic work program of the Region are discussed further in the attached note.

I would appreciate receiving your comments by close of business on October 20, 1974.

cc: (for information) Messrs. Benjenk, Bart, Paijmans, Wapenhans, el Darwish
(for comment) Messrs. Asfour, Chopra, Dubey, Lachman, Maiss
Country Economists, EMENA
Messrs. Stewart, de Capitani, Serageldin

FColaço/am

OP-RESEARCH
(DETERMINANTS OF SCHOOLING
IN N.E. BRAZIL)

Mr. D.C. Rao, Office of the Vice President, Development Policy

October 10, 1974

John A. Holsen, Senior Economist, LAC I

Review of Research Proposal on "The Determinants of Schooling in Northeast Brazil"

1. The postponement of the meeting on the above study may make it impossible for me to participate since I will be going to Honduras on an economic mission next Monday. Consequently I am expressing my views in this memo.

2. Education in Northeast Brazil (particularly the eight or nine years of basic education with which this project is concerned) is certainly an important topic for study -- particularly as a form of social investment to improve the quality of the human factor of production whether as a migrant or as a continuing resident of the region. ECIEL is certainly a responsible multi-national research group of the sort which merits support -- although in this case the fact that it has already mobilized some $1.2 million dollars for its research in education may make Bank Group less necessary than in some other cases.

3. My most important doubts regarding the proposed research project relate to the methods to be used and the cost relative to the likely results. As I understand it, the procedure will be to take household survey data prepared for other or general purposes and, by running regressions on the computer, see what one can find out about the determinants of schooling. This does not look like a very promising approach to me. A great many of the relevant factors are probably not considered in the household surveys; others may not prove suitable for use of regression techniques or be available only for one point in time rather than for the period of time relevant to education decisions. Moreover, the nearly $100,000 budget looks like a lot for what seems mainly to be running lots of regressions (and rationalizing the high R-squares) from data which has already been prepared for computer processing. For ≈ $100,000 one ought to be able to develop some hypotheses, decide upon the kinds of information which would enable one to test them, and then collect and analyze the relevant data.

4. In my own work on Brazil my association with the education sector was limited. But some of the things I remember are (a) the day the driver was very sleepy because he had stayed up all night waiting in line to try to get his daughter admitted to a good school, (b) the large numbers of lower middle class teen-agers coming out of school at 9:30 in the evening because schools were working on a double shift in Salvador (Bahia), (c) the lack of "reality" or relevance in the elementary school text books I bought, (d) the small farmer who said that, by the time his children were strong enough to walk the long distance to school, they were also strong enough to be of significant help at home. There are lots of operationally useful hypotheses to be formulated and tested. But will the proposed regression runs help very much?

cc: Messrs. Jallade (Education), King (Development Economics), Schulmann (P&B), Tsantis (LAC Projects).

JHolsen:ms.

ON-RESEARCH
(RPO#320)

October 10, 1974

Mr. Paul Berthoud
Assistant Executive Director
United Nations Environment Programme
Post Office Box 30552
Nairobi

Dear Mr. Berthoud:

Traffic Restraint Study (Singapore)

NOT ATTACHED

In connection with our study of Traffic Restraints in Singapore, I enclose material in response to the Guidelines for the Preparation of UNEP Project Documents. In addition to statements drafted to correspond to specific items in the Guidelines, there is also a copy of the proposal as it was submitted to and approved by the Bank's Research Committee last June (with a few statements concerning the timing updated). There are, of course, some items in the Guidelines that are not possible for us to answer and for which your own staff will have to supply the appropriate information (specifically Items 1.03, 4.01, and 5.02; in addition perhaps you will wish to add something to 2.01).

We are sorry that this material was not ready to send earlier. It was delayed by Mr. Holland's travels and other activities, and by the necessity for replanning the entire time schedule quite recently when we were informed of a change in the Singapore Government's plans for implementation of the restraint scheme.

They have concluded that February 1975, the previous target date, would be too soon to allow provision of adequate fringe parking and shuttle bus service as an alternative to driving private cars downtown, and have decided to bring the "park-and-ride" scheme into operation about May 1. Furthermore, they have decided not to impose the restrictive licensing scheme and increased parking rates simultaneously with the "park-and-ride" arrangements, but to phase them in about July 1, 1975, allowing an interim period for commuters to learn about the facilities and for the parking attendants and bus operators to get their operations working smoothly.

I trust that the enclosed materials include everything necessary for your staff to complete preparations of the project document. If not, please let me know what else is needed, and I will try to supply it promptly.

Yours sincerely,

Clell G. Harral
Chief, Transport Research Division
Transportation & Urban Projects Department

EPH
Enclosures
EHolland:phm
cc: Messrs. Dunkerley, Holland, Watson

O.P. Research
(Singapore Traffic
Restr.

October 10, 1974

Mr. R. Hubbard
Wilbur Smith Associates
Columbia, South Carolina

Dear Bud:

As I mentioned to you some weeks ago, we have not received a billing for Bruno Wildermuth's services against the Singapore Traffic Restraint Research Project for the period up to last June 30. I think there must have been a few days of Bruno's time involved, and as this involves last fiscal year funds, I should be grateful if you could promptly submit a billing so that we can close this account.

With many thanks.

Sincerely yours,

C.G.H.

Clell G. Harral
Chief, Transport Research Division
Transportation & Urban Projects Department

CGHarral:phm

cc: Mrs. Christensen
Mr. Holland

INCOMING TELEX

UOP Research

Distribution:

Mr. Ahluwalia

IB42

Yes
RPO 308

AY131 201 SSS BANGKOK 112 09 0806Z;
ETATPRIORITE Oct. 9, 1974
INTBAFRAD
WASHINGTON DC (USA);

C O N F I D E N T I A L

4538 AHLUWALIA YOUR LETTER ONE OCTOBER 1974 DOES NOT INDICATE RECEIPT OF OUR CABLE 4089 OF 16 SEPTEMBER IN WHICH WE MENTIONED OUR ORDER OF PREFERENCE OF CANDIDATES PROPOSED. VISWANATHAN ALSO WROTE TO YOU ON ONE OCTOBER STRONGLY EMPHSIZING OUR PREFERENCE;
P2;
FOR NARAPALASINGAM AND REGRETTING OUR INABILITY TO ACCEPT VISARIA. UNDER THESE CIRCUMSTANCES SUGGEST YOU DO NOT MAKE ANY COMMITMENT TO RECRUITMENT VISARIA FOR ESCAP/IBRD INCOME DISTRIBUTION PROJECT. SUGGEST YOU DISCUSS AND REREVIEW MATTER OF SELECTION OF CANDIDATES WITH VISWANATHAN WHO WILL BE IN NEWYORK 19 THROUGH 26 OCTOBER ;
P3/12;
1974 AND CAN BE REACHED CARE GOLDBERG STATISTICAL OFFICE UNATIONS HEADQUARTERS;

ROYSMITH "

EPH - you may want a Xerox of this to take if you're done ✓

Logged Oct. 17, 74

THE UNIVERSITY OF LEEDS

Professor and Head of Department: J. W. Birch
Professor of Urban and Regional Geography: A. G. Wilson
Professor of Physical Geography: M. J. Kirkby
Deputy Head: F. J. Fowler

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Leeds
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Holland ~~Watson~~ dei files

ON-RESEARCH
67/20

Our ref; AGW/APB

8th October, 1974.

Mr. C.G. Harral,
International Bank for Reconstruction
and Development,
1818 H. Street, N.W.,
Washington D.C. 20433,
U.S.A.

Dear Dr. Harral,

Thank you for sending me a copy of your various papers on the Singapore study. I have no comments on the papers as such, but I noted with interest that you are investigating fringe car park schemes. Some of my colleagues have been working on this kind of problem in Leeds and you will be interested to read about their work. I am enclosing a paper which describes it in outline and more detailed papers will be available in due course.

Best wishes.

Yours sincerely,

Alan Wilson

A.G. Wilson.

VOP-RESEARCH
CC: OP-LOBDSON

Those listed below

October 7, 1974

D. C. Rao, VPD

Inter-Agency Meetings in Research

The following are the staff members at USAID responsible for the various subjects referred to in Mr. Stern's memorandum of June 19:

Population	:	Carl Hemmer, PHA/POP
Employment and Income Distribution	:	John Eriksson, PPC/PDA and Peter Thormann, PPC/PDA
Rural Development	:	Donald McClelland, PPC/PDA and Jerome French, TAB
Education	:	Jay Etta Hecker, PPC/PDA

cc:

Distribution

Messrs. Ballantine, Yudelman, Kanagaratnam, Leiserson, Ahluwalia, T. King, B. B. King

DCRao:gm

OP-RESEARCH
(RPO #277)

Miss K. DiTullio, ECDND

October 7, 1974

D. C. Rao, VPD

Small Industry - RPO 277 - Completion Report

Further to my memorandum of September 23, the completion report for this research project is overdue. Please send it to me as soon as possible.

cc: Messrs. Westphal, Gulhati, B. B. King

DCRao:gm

Research gen

Distribution

October 7, 1974

Oktay Yenal

Index-Linking of Financial Contracts

Professor Bhatia's paper and seminar presentation on the above subject provoked a number of responses. As this is a subject of continuing interest, I am circulating a selection of these comments.

Enclosures

Distribution

Chandavarkar
Dorrance
Dosik
Gulhati
Hughes
Hutcheson
Hyde
Khatkhate
Krishna
Leiserson
Michaely
Que
Raizen
Rao
van der Mel
White

Office Memorandum

TO : Mr. Yenal

DATE: September 17, 1974

FROM : Graeme S. Dorrance

SUBJECT : Index Linking of Financial Contracts

Thank you for including me in the list of those requested to comment on this paper. I also look forward to next Friday's seminar on this subject.

This is a rather complete survey of the problems associated with indexation. I believe that it will be quite easy for someone to go through this text and compile a list of the questions that might be examined in any complete study of indexation. However, it fails to indicate the priority that might be attached to individual questions. If the Bank were to consider publishing this, I think it would need considerable editing before it were issued. For example, something like the last paragraph appears approximately five times in the text, and the statement that we don't know enough about the subject (e.g., top of page 27) is repeated several times. I also consider the writing to be somewhat prolix. However, I will try to refrain from making any further editorial comments.

It is useful to have the bibliography that Professor Bhatia has compiled. He certainly was able to identify more responsible pieces on indexation than I thought existed. However, there are some strange omissions from his bibliography. For instance, Friedman's essay on monetary correction published this year is not included in the bibliography despite the fact that it is quoted in the text (page 49). This is rather strange since Friedman's reaction to his Brazilian trip is partly responsible for the current fashionableness of this subject among monetary economists. Similarly, there is no mention of McKinnon's work on this subject although this has also contributed to the current interest. Professor Bhatia's appendix on linkages used in various countries is not as complete as he suggests on page 15. For instance, it does not include the indexation of deposits with mortgage institutions in Colombia. I make no pretense of knowing all of the indexation arrangements that have been developed over the years.

I find the logic somewhat tortured in several places. For instance, on page 41, Professor Bhatia simultaneously assumes that markets react to reflect inflation expectations and that the government can intervene on the market to adjust interest rate spreads because the markets do not react to inflationary expectations. Similarly, on page 45 through 48, Professor Bhatia is able to construct a model assuming a situation of zero inflation that involves price increases.

I think the study suffers from a basic weakness in that Professor Bhatia does not clearly identify the indexation of capital values and the readjustment of interest rates as separate types of policy (e.g., at the top of page 20). The two may be associated but they involve alternative solutions to a settlement

of the same problem. Further, interest rates may change for reasons other than changes in price expectations. Constant price interest rates change from period to period in response to liquidity preference or availability pressures. Hence, the two subjects should be fairly rigorously separated in any discussion of the problem of financial market reactions to potential inflation.

I disagree with the first sentence of the draft. Inflation is a part of life all over the world at the moment, but this widespread inflation is a very recent phenomenon and there is no guarantee that it will persist. My own interest in the question of index linking arises very largely because I believe that the interest rates on many contracts that are being reached currently reflect expectations that inflation will persist, whereas it is quite possible that inflation will come to an end. If inflation should come to an end, these contracts will impose quite severe burdens on borrowers and may threaten the liquidity of the financial system. In other words, I believe that as strong an argument may be made for indexation on the ground that it provides protection to borrowers if inflation is halted as may be made on the ground that it provides protection to lenders if inflation is not halted. I also think that, in the present world with most interest rates largely influenced by inflationary price expectations, the borrower protection argument may be the more important one. The essential point is that neither inflation nor deflation is ever correctly anticipated by everyone, and the degree of incorrect anticipation is likely to be related to the strength of the current inflation or deflation. Hence, the basic assumption of the third sentence of this draft is untenable.

The term inflation tax is widely used with the implication that because it is a "tax", the benefits pass to the government, e.g., on page 7. There is no inherent reason for this to happen in an inflation. Holders of cash balances and other assets denominated in money lose while holders of physical assets gain. There is a transfer within the economy but not necessarily to the government.

I think the discussion on page 4 rather misses the point that the developing countries are poor countries and therefore unable to generate those savings that they desire for investment. No amount of tinkering with financial institutions can overcome this basic problem.

I think that the discussion on page 5 rather misses the important point about unorganized markets in an inflation period. They are usually exempt from many of the restraints imposed on the organized markets and hence flourish under inflationary condition. If interest rates are right or if financial assets are indexed, much of the incentive to the development of an unorganized market disappears.

If the conclusions in the first paragraph on page 6 are correct, any study must be much deeper than is intimated in this draft. My own view is that this paragraph greatly overestimates the problem.

I am not sure that the section on the effects of inflation is necessary in a draft of this type.

The argument on resource allocation effects, starting on page 7, might have devoted more attention to the inducement for inventory and other short-term physical assets.

The discussion on page 11 ignores the argument that real balance effects will work to halt inflation and that indexing eliminates the real balance effect. In my opinion, this is perhaps the most serious argument against indexing. This consideration is also dismissed rather cavalierly on pages 36 and 37, and again on page 78.

At the bottom of page 11, it might be mentioned that, if the capital value of a financial asset is indexed, the total "interest rate" that it bears may be lower than if it is not indexed. The sum of the expected indexation plus the nominal interest rate may be less on an indexed asset than on an unindexed asset because indexation eliminates one element of risk that an asset bears, and risk-free assets tend to carry lower interest rates than risky assets.

I think that in the listing on pages 16 and 17, indexation based on the price of product produced by a borrower should be included as a separate type of indexing.

It is true, as Professor Bhatia states, that a financial asset linked to wages may lag behind a general price level. Yet, as long as wages reflect changes in prices, such bonds will have a certain degree of linking and will lag less than if their conditions are fixed in nominal terms.

On pages 19 and 20, Professor Bhatia might mention investment in real estate as one of the avenues open to small investors to provide a hedge against inflation. By investment in real estate, I mean investment in structures. The incentive to obtain protection by having a residence more commodious than is necessary involves the absorption of resources that is not involved in mere transfers of existing property.

I think it is impossible to be as dogmatic as Professor Bhatia is in the middle of page 20. It is quite possible that index linking will reduce the real yield on financial assets. The comparison that should be made is with the yields that would prevail if there were no indexing and if there were widespread expectations of continued rapid inflation.

I do not think that the discussion of the Finnish experience really covers the question of the effects of index-linking on financial savings. It really deals only with distribution of purchases of different types of assets, and this distribution is largely affected by the supply of bonds that are made available by the government.

I think that the argument on page 25 is a little weak. If indexation should make saving relatively more renumerative, it must lead to a substitution of saving for consumption, even though this effects may be small.

I think footnote reference 2 on this page should refer to the Mikesell and Zinser article quoted on page 28. Incidentally, M&Z come out very strongly in support of the real interest effect on saving.

On page 26, it should be made clear that indexation will tend to raise the real yield on saving even if prices are rising at anticipated rates and there are deterrents (such as usury laws or conventional traditions) limiting the nominal yields on financial assets.

The assets referred to in the second paragraph on page 26 can only provide a perfect hedge against inflation if the risk that is hedged against can be measured. As I believe that it is unrealistic to expect that an inflation will be perfectly anticipated, such a hedge cannot be perfect.

I realize that Professor Bhatia is quoting arguments rather than presenting them in the material starting on page 31. But even so, I think the assumption that money interest rates are unchanged when indexed bonds are issued is unrealistic. In fact, in his discussion Professor Bhatia does not maintain this assumption.

I will put in one editorial comment. It is not immediately clear that the firms discussed in the third paragraph on page 31 are those that are first "dichotomized" into self-financing firms, rather than firms that are "categorized" into those anticipating a smaller rise in the index than the market generally accepts.

At the bottom of page 32 it is not clear why banks should rank prospective projects in the order of social rather than private returns.

The statistical relation on page 38 regarding Finland is quite irrelevant. The 1972 and 1973 figures reflect the world inflationary situation and are unrelated to indexation or non-indexation. Similarly, the facts given for the Brazilian experience are incomplete and the argument is largely irrelevant. For example, the conclusion at the top of page 39 ignores all the other policies that the Brazilians have implemented.

I admit that the discussion at the middle of page 42 is quite tentative, but Professor Bhatia might have mentioned that the manner in which expectations are formed is probably influenced by the current level of inflation. That is, the weighting pattern applied to current and earlier price changes is likely to vary with the current rate of inflation.

Part of the problem that indexation is intended to deal with arises from the fact that money markets do not function even reasonably well in most countries. Therefore, the assumption at the top of page 43 is rather unrealistic. The comments on the reaction of the population to changes in the government's pattern of bond issues assumes a very knowledgeable population that is probably more sophisticated than even the bond analysts employed by major financial institutions in developed countries.

The sentence at the top of page 45 is rather dogmatic. I do not see why some sort of government equities cannot be issued without causing unintended and arbitrary distortions of the allocative mechanism of the capital market.

I find the reference to Gresham's Law on page 53 rather strange. This draft seems to suggest that indexed bonds are superior to unindexed bonds and securities. Gresham's Law states that bad (not good) money drives out good (not bad) money.

I find the diagram on page 54 rather difficult to follow. It is made more difficult by the fact that the ordinates are not fully described in the text. As I read it, a shift of B^d_{r2} to the right should be associated with the shift of B^d_{m2}, also to the right rather than to the left. This probably reflects my misunderstanding of the diagram. However, if this diagram is to be retained, I think it should be described more fully.

The paragraph in the middle of page 55 accepts a hypothesis that a shift in the composition of the government debt issues will lead to a change in the spread between the yields on different types of security. This reflects a hypothesis that the term structure of interest rates is strongly influenced by the supply of securities on the market. This is an hypothesis with which I have great sympathy, and which I would like to be able to accept. However, the evidence of such actions as U.S. "operation twist" casts doubt on it. I do not think it can be accepted with quite the trust that Professor Bhatia seems to put in it.

The section starting on page 56 is an interesting piece on some of the practical problems associated with indexing. However, there is one point that I do not think is dealt with adequately. If indexing is to be accepted, I believe that it will only be successful if both sides of financial institutions balance sheet are indexed on the basis of the same or highly similar indexes. On rare occasions such as the revaluation associated with the German monetary reform in 1948, it may be possible to accept unbalanced shifts on opposite sides of financial institutions balance sheets. In the German case, the assets side of the financial institutions balance sheet declined more than the liabilities side. Therefore, the situation could be solved by the issuance of government-guaranteed equalization certificates. However, aside from rare instances such as the German case, I think the acceptance of indexation must assume that both assets and liabilities are indexed.

The argument at the bottom of page 59 and top of page 60 ignores the point that if deposits are transferred, they must be redeposited in financial institutions unless there is capital outflow.

It is not necessary that financial institutions that have indexed assets and liabilities have similar maturity structures on both sides of their balance sheets, as suggested on page 60. Financial institutions arise in large part because a community has dissimilar maturity demands for assets and liabilities. There is no reason why financial institutions should not facilitate the transformation process in an indexed economy as well as they do in a non-indexed economy.

I think the last sentence of the paragraph ending on page 62 is quite wrong. If capital values are not index-linked, the term structure of interest rates will reflect inflation expectations. If the capital values are index-linked, then the term structure should reflect no more than liquidity and time preference influences.

The real danger in the present situation is presented on page 63. If present inflation could be contained, many borrowers are going to be faced with serious burdens. The argument for achieving indexing as quickly as possible is that it will prevent these burdens from being accepted.

Several statistics at the bottom of page 65 are presented in current price terms. It might have been useful if these had been translated into their constant price equivalents.

It might be recognized at the top of page 66 that the terms on which acceptances are quoted in Brazil has an indexation effect. I think the two last sentences in the paragraph at the top of page 66 are rather optimistic.

There is no reason why the unorganized markets cannot develop their own systems of indexing. If indexing becomes acceptable, there is no need for it to be dependent on government fiat as suggested at the bottom of page 66. The important thing is that unorganized markets have thrived partly because the organized markets have been subjected to restraints that were inconsistent with the present inflation. For discussion, it might be valuable to drop the terms "organized" and "unorganized" and substitute something like "markets subject to institutional controls" and "markets outside the purview of institutional controls." These "unorganized" markets have been able to offer interest rates that were consistent with inflation--they have achieved one form of indexation; they could easily accommodate other forms. If indexing were adopted in the organized markets, one of the most important effects would probably be a shift of funds from the unorganized to the organized markets.

There might be some mention of the Canadian renegotiation of mortgages every five years in the discussion on page 69 as one example of what might be done.

The statement at the top of page 71 that there is no definite correlation between GNP and inflation should be specified to state that there is no correlation between constant price GNP and inflation. There must be a correlation between current price GNP and inflation.

It should be pointed out that a national equity achieves aims additional to inflation protection. If it be argued that incomes should be related to the average productivity in an economy a national equity provides this relation for rentiers as well as for wage earners. At the same time, it can provide inflation protection as well.

The section beginning on page 71 is irrelevant to the paper.

The argument at the bottom of page 73 and top of page 74 is not clear. Surely the suggestion that interest rates may be at 70 per cent while prices are rising at 50 per cent is unrealistic. This is probably a misprint.

The Chilean problem discussed on page 75 is not really related to indexation through the exchange rate. This problem can arise in any country with a convertible currency facing inflation. One of the outstanding examples was the Mexican experience in 1953 and 1954.

I agree with most of the arguments relating to the cost of living index on pages 75 and 76 even though I think that the cost of living index is probably the best to use. McKinnon argues that a wholesale price index should be used. His argument is based on the assumption that the problem is one of portfolio balance in which assets are distributed between financial assets and physical assets, and that therefore the constant price value of financial assets should be related to the value of the physical assets that it is possible to hold in portfolios. My own view is that one of the major problems that indexation is intended to solve is the distribution of outlays between saving and consumption. On this assumption, it is the cost of consumption, i.e., the cost of living index, that is relevant to indexation.

I do not understand the footnote on page 78. I suspect it is incorrect. Index-linked financial claims are recognized in the United States. In fact, the SEC claims to have supervisory powers over all indexed claims, including some of the indexed life insurance policies that are now issued.

cc: Mr. Khatkhate
Mr. White

Office Memorandum

TO : Mr. Shanker Acharya (IBRD) DATE: October 2, 1974

FROM : A.G. Chandavarkar

SUBJECT : Index Linking of Financial Contracts: (IBRD Studies in Domestic Finance No. 7) by Mr. K.B. Bhatia

Thank you for giving me an opportunity to read Mr. Bhatia's paper and to attend his seminar.

I have only a few brief comments which really arise from the "state-of-the-arts" rather than Mr. Bhatia's very useful and competent study.

(1) Indexation cannot be conceived as an "open ended instrument" or a built-in element in the policy armory of any economy, in which event we may encounter the familiar objection of introducing a dual standard of value. Rather its more limited objective is akin to that of "one-shot" weapon like a capital levy, or a monetary reform, to counter a movement, say, from mild to high inflation. This in turn raises difficult questions of the precise timing of "introduction" and "withdrawal" of indexation once its objectives are achieved. Therefore, the "announcement effects" of introducing and withdrawing indexation are important. The literature does not seem to deal with these aspects.

(2) In addition to the "efficiency" aspects the equity aspects of indexation in the LDC are important since the bulk of the population is outside of the organized sector, and the net debtors (peasant farmers and landless laborers) are predominant. The equity case for indexation should not be made to rest on the need to protect a comparatively small minority of organized industrial wage-earners and owners of financial titles. Even if it is argued that indexation would help to increase the ratio of financial assets to aggregate savings, it would still be a second best argument for indexation. This objective could more easily be achieved by realistic rates of interest and structual reforms in the financial system, including financial liberalization.

(3) The whole complex of questions relating to indexing and unorganized markets (pp 66-67) is admittedly empirical as indeed are many of the really relevant policy aspects of indexation. The proportion of agricultural loans in kind in judging from the All India Rural Credit Surveys is not very significant. To the extent they exist this practice is not so much a conscious hedge against inflation as an indicator of the imperfect monetization of the economy.

(4) A more interesting question is whether indexation will stimulate the "marketed surplus" of agriculture. The effects may well be indeterminate. The variations in the marketed surplus are more properly to be interpreted in terms of the "maximization of income or aversion of risk" by the farmer rather than a studied response to inflationary trends, although this element cannot be wholly ignored.

(5) The technical aspects of indexation in the LDCs also merit more attention than they have received in the literature. Even if one were able to devise a representative index, the concept of indexation itself may be a little too sophisticated for the average saver. Also, there are difficult technical problems relating to indexation of non-dated stock (e.g. the 1986 or later Conversion Loan in India) and the vary varied maturity-pattern of public or private financial obligations.

(6) Finally, the merits of indexation will have to be argued in terms of its efficacy as part of a wider policy package comprehending incomes policies, realistic rates of interest, etc. Even in Brazil, more than indexation, the stringent fiscal and wage policies will be seen to be the more influential factors.

cc: Messrs. Tun Thin
Woodley
Dorrance (CBS)
W.H. White (Research)

Office Memorandum

TO : Mr. Oktay Yenal, ECDPF, IBRD

DATE: August 28, 1974

FROM : W.H. White

SUBJECT : Requested comments on Prof. Kul Bhatia's "Index-Linking of Financial Contracts" June 1974

The following comments may be of use in the completion of this interesting study on a subject which is currently of importance in economic policy making. Since the paper is in many respects parallel to my own study, which you have no doubt seen (and which is in process of revision), I have been in position to make many more points than the average commentator. If any of them seems to merit further discussion, I would be glad to pursue the matter.

1. The author introduces an interesting argument against the familiar reasoning that saving need not increase in response to those increases in interest rates that are brought about by policy rather than by increases in real productivity (pp. 27-28). The reason for no savings-stimulating effect of increased interest rates is of course that with higher interest rates the same future consumption can be attained by means of smaller accumulation of savings. The author argues that, for policy increases in interest rates, the future increase in income needed for supplying such increased consumption with the same (or a reduced) productive capacity will be unavailable. Hence the motive for saving less or at least for not increasing savings when interest rates rise cannot exist.

This seems an erroneous inference from the valid observation that policy rises in interest rates do not increase future real income (allocative efficiencies neglected). For simplicity distinguish savers-interest recipients from the zero savers. The rise in interest rates may be treated as causing an interest cost push rise in prices so that the increased factor payment has no counterpart in increased real income. But the interest recipients will have a net increase in real income from the rise in the interest receipts while the others will have a reduced income. Thus the saving classes as a whole do properly conclude that they will get more future income from the same or a reduced amount of current saving when there is a policy increase in interest rates, even though total future real income will be unincreased. (To the limited extent that the non-savers could make sustained dissavings, the future benefits to the interest-receiving class would be diminished, but that would not change the findings qualitatively.) The conclusion would seem to be that the attack on the familiar argument should be suppressed.

2. The criticism of Arvidsson's treating of externally-financing firms (p. 32, lines 3-5) on the ground of neglect that they are at the same time doing some self-financing of their investment outlays seems unjustified. If their investment programs are so lucrative or urgent as to call for external financing, the part that is self-financed will be even more urgent and can be taken to be uninfluenceable by conditions on the capital market such as the availability of indexed debt. Hence their external financing behavior can be analyzed by itself.

3. Is the argument that government open market operations (borrowing via indexed issues to repay unindexed) could narrow the spread between yields on indexed and unindexed bonds and in that way reduce the public's expected rate of inflation (mid p. 41) a slip into the reasoning that changing the symptom will also influence the cause of the sympton? Anyway the footnote seems to say that other than temporary changes in the spread are impossible.

4. Should "higher" in line 7, p. 44, be "lower" and the "excess"'s in the next line be "deficient"? If so, is the passage then made sufficiently intelligible?

5. The last three sentences of the footnote on p. 46 explain the claim of a steeper slope for the LM curve in the presence of indexing but the presentation is garbled and unintelligible.

6. The paper's figure 1, taken from 1973 article by Waud, (p. 47) contains the original author's error--an error which exaggerates the case for indeterminacy of results. The diagram's IS" curve should be deleted and its IS' curve shifted to the left of its present position by enough so that it will intersect the IS'-bar curve vertically above point y_0. (This correction makes it more likely that introduction of indexing will aggravate or moderate inflationary developments to only a small degree.) The reason for this necessary position of the intersection point is that at y_0 the differences in wealth effects under discussion is not at issue since the price level is by assumption unchanged.

7. The discussion of the material represented by the diagram seems highly challengeable on the ground that once it is assumed that the levels of real (or of nominal) interest rates on indexed and unindexed bonds will be the same--as is implied in this analysis--it is no longer possible to treat the unindexed bond as yielding a higher real interest rate that is counterbalanced by an equal, negative wealth effect while the indexed bond yields a low real interest rate and a zero wealth effect; the more tolerable assumption is that the bond holder treats the part of the interest received on his nominal bonds that compensates for inflation as a capital account item that serves to maintain the real value of his bond holdings rather than as income. Hence the two regimes are the <u>same</u>, and the three pages devoted to the Waud paper can be deleted. (There are other problems with Waud's article as well.)

8. Indexed foreign borrowings such as from the World Bank are said to be doubly difficult if the funds are reloaned without indexing (#4, p. 59), "because they will have to cover both the inflation and devaluation risks." But insofar as exchange rates tend to move with purchasing power parities it is only the inflation risk--the hard-currency country's inflation as well as that of the home currency. Faster inflation at home means devaluation, but that is devaluation instead of inflation. (Exchange rate movements can deviate from purchasing power parities even over the long runs of concern here, but the deviations can be for as much as against the borrower country.)

9. The paragraph, bottom p. 59-top p. 60 is self-contradictory and contributes little.

10. The table and discussion p. 73-4 of indexing only for the principal and for interest as well reflects the consequences of the implicit assumptions used: principal adjusted to the price index only at the end of the year, interest paid on the year's value of the bond, with the end-year adjustment ignored. If the bond's value were adjusted to the index without this discrete one-year lag, then it would be found that payment of the stated rate of interest would provide what the author now thinks is a double adjustment. His need for a double adjustment is the consequence simply of his assuming that each year's value adjustment is irrelevant until the following year's interest is computed.

11. The rejection of indexing to hard foreign currency on the ground that it implied paying off short-term lenders in foreign exchange and thereby stimulating capital exports (p. 75) seems unjustified; the example cited may have been a case of attracting foreign funds into a reserve-short country, but the topic under discussion is indexing for the benefit of domestic lenders of funds; for them the foreign exchange link is simply a more trustworthy form of price index.[1/] The following point that having large foreign currency debts inhibits devaluation is not a strong point against that linkage, for it would to some extent apply even if a local price index were used instead of foreign currency; devaluation has a strong effect on the price levels of the kind of country at issue here.

12. It is concluded, p. 74, that indexing should not be officially restricted (to, e.g., small savers buying special government securities) because of the distortions and the difficulties for other financial institutions and borrowers. This conclusion seems defective because it opens the way for near universal indexing of financial contracts, with a resulting bias toward explosive reactions to unexpected increases in prices.

The author presumably would defend his unconcern with the risk of aggravating inflation because of his previous arguments on Radcliffe (p. 36), Baumol-Patibkin (p. 37) and Waugh (see point no 6 above). The first was that labor already has the benefits of rough indexing since it can prevent reductions in its real wages; but that is explicitly not the case for savers, particularly small savers: one of the premises of the discussion on p. 74 is that small savers are prevented from protecting the real value of their interest income by the existence of interest ceilings or usury laws; indexing was needed precisely to make those laws consistent with positive real interest rates.

1/ Some residents will have bought the exchange-rate indexed bond instead of buying foreign exchange, but to that extent the incurring of a foreign-currency-denominated debt causes no weakening of the government's foreign asset position.

The author's second argument that widespread introduction of indexing of financial contracts would not be upward destabilizing is that a) it would also be downward destablizing if a fall in prices happened to develop, b) that it is (somewhat) less destabilizing if money is not included among the indexed financial assets, as seems plausible, and c) "in a real world situation, with fixed exchange rates" the authorities would be forced to take offsetting anti-inflationary measures for balance-of-payments reasons!!!

Finally the author is misled by a further defect in the Waud analysis. He reproduced the Waud argument that upward shifts in demand could be either more or less inflationary if they occurred after the introduction of indexing of bonds. The uncertainty of direction of effect is apparently taken to mean that any net effect would not be a large one. However, the wealth effect at issue was only that caused by the price rise coming from the original upward shift in the IS curve. In reality we must consider the cumulative wealth effects from the price increases of various origins (including cost-push) that occur over a sequence of years. The difference in real wealth between the holding of indexed and unindexed financial assets can become very large here. The effects on savings and on the desired money stock must also become very large. This has the consequence that it is not permissible to dismiss the possibility that the spread of indexing to bonds would destabilize the economy on the ground that it might also stabilize it; if destabilization is the correct conclusion it would plausibly be a serious destablization. The correct inference would seem to be that we should hold off from the introduction of widespread indexing favored by the author until we are able to estimate whether the effects will be harmful.

13. The conclusion section's finding (p. 78) that adoption of indexing has no definite effect on expectations of inflation seems to conflict with the same sentence's conclusion that indexing is primarily a palliative for inflation. If that is its real function, then its adoption should create expectations that inflation will continue (at least, that it may continue).

That indexing's contribution to the effectiveness of stabilization policies, achieved through the Pigou effect, will be small or zero (same paragraph) seems misstated. The Pigou effect at issue is a reduction in desired savings, so the evaluation should be of indexing's hindrance to stabilization, not its contribution. And in any case the tone of the author's discussion through the paper is that indexing will in practice increase savings because it will permit a rise in the real interest rate in the common situation of restricted levels of nominal interest rates for small (and other) savers.

14. That indexing is less used than the arguments for it should require is explained by institutional conditions: France's legal prohibition and the U.S. negotiable instruments law (bottom p. 78). But the French law is the consequence of France's having decided to end its period of heavy indexing, and the U.S. legal restriction is not an "institution." It would be easily revokable by a decision to permit indexing.

15. Mid p. 79 says that the "real reason" for stopping indexing in Finland was "that it would contribute to inflation". Is that consistent with the same paragraph's final: "nevertheless, it remains to be proved that index-linking caused the initial inflation or even exacerbated it considerably in Finland." Perhaps the author intended "a belief" to be placed before "that it would contribute to inflation."

In any case, is he justified in rejecting the following Finnish belief: when a small export-oriented country devalues to improve its trade balance the presence of pervasive indexing will prevent the devaluation from succeeding because it will push prices up rapidly to equal the rise in import and export-type goods' prices.

cc: Mr. Bhatia
Mr. H. R. Heller
Mr. Y.C. Park

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

1818 H Street, N.W., Washington, D.C. 20433, U.S.A.

Area Code 202 - Telephone - EXecutive 3-6360 - Cable Address - INTBAFRAD

October 4, 1974

Dr. Kul B. Bhatia
Department of Economics
University of Western Ontario
London, CANADA

Dear Kul,

Thanks for your letter. I have set afoot the processing of the travel expenses. We have also sent you 25 copies of your paper (dispatched about 10 days back) which should have arrived by now.

To reiterate my verbal remarks from the day of the seminar, I must congratulate you on a very able presentation of your paper. We all thought that the seminar was successful in (a) airing the "state-of-the-arts" on the subject and (b) providing you with some feedback from the audience on your current draft. I think we agreed that the nature of the feedback did not warrant any major revisions of your paper. You already have detailed written comments from some sources, and no doubt, kept some notes on the seminar discussion. To aid you further in your revision, I am enclosing -

(a) a retrospective, and personal, view of the seminar discussion by Shahid Yusuf (whom you met when you were here);

(b) a recent "journalistic" piece on the experience in Colombia of partial indexing (partial in the sense of indexing limited to a segment of the financial market); it concludes against efforts of index-linking restricted to part of financial sector;

(c) the marginal comments made by D.C. Rao on his copy of your paper;

(d) some comments from Mr. Anand Chandarvarkar (IMF).

I should also like to reiterate and endorse some of the points/issues raised in the seminar, particularly by Rao, in case your own notes of the discussion are sketchy:

(i) When discussing index-linking as a policy proposal, one needs to compare with alternative policy packages, e.g. freeing of (assumed pre-existing) restrictions on interest rate controls, recontract provisions, etc.

(ii) A propos of above, it is an interesting question: is there a threshhold level of inflation at which, in mature, free, financial markets, the market agents would themselves engage in indexed contracts to protect against uncertainty with regard to future price variations?

(iii) At present, the paper focuses on the higher real yield effects of indexing, rather than on the reduced uncertainty effects; the latter is recognized as important in the concluding sections, e.g. p.77, but you might consider giving this consideration greater weight earlier in the discussion;

(iv) Given that in most LDCs financial markets are nascent, and subject to various dimensions of "market failure" (in the neoclassical sense), can the officially-sponsored initiation of indexing of financial contracts be regarded as a useful, corrective intervention?

(v) In any policy context, it is likely to be important to identify and distinguish between good and bad administrative aspects. In this respect, the paper's reduction of all indexing variations into a yield dimension may be misleading;

(vi) One can readily agree that the role of indexing as an anti-inflationary device presumes a prior acceptance of a theory of inflation which accords explanatory importance to expectations; and since such an acceptable theory is yet to emerge, discussions about the role of indexing on expectation and thence on inflation, must remain speculative;

(vii) The subjects of neutrality of money and the Pigou effect deserve the downgrading that are already implicit in your paper;

(viii) Finally, one can clearly endorse and emphasize your calls for "non-journalistic" empirical evaluations of indexing experience.

In addition to all of this, Shahid Yusuf was provoked by your seminar into penning somewhat more introspective musings on the subject of indexing. These will be ready by Monday at which time we shall send them on to you. As I understand these will be heavily slanted towards a developed country scenario and will take a much wider political-economy view of the role of indexing. Though their value to your paper-revision process may be small, I am sure you will enjoy reading them.

I hope you will treat all of the above for what they are: comments on a seminar paper which may be taken into account or ignored as the author chooses. I will, of course, be at the end of a telephone line to the extent that verbal elaborations of individual comments may be useful.

Can we look forward to a revised paper in about a couple of weeks from your receipt of this letter?

Hope you are flourishing. Everyone here sends his regards.

Best wishes,

Sincerely yours,

Shankar N. Acharya
Public & Private Finance Division
Development Economics Department

Enclosures

cc. and cleared with Mr. Ismal
cc: Messrs.. Bery and Yusuf

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

1818 H Street, N.W., Washington, D.C. 20433, U.S.A.

Area Code 202 · Telephone - (Executive 3 6360 · Cable Address - INTBAFRAD

October 4, 1974

Professor Kul Bhatia
Department of Economics
University of Western Ontario
London, Ontario
CANADA

Dear Professor Bhatia:

The index linking seminar is a hazy memory, so I have been forced to recapture the echoes of the event from the heiroglyphics scattered across my note pad.

I present below a 16 m.m. version of the discussion without the smoke and the tension, but interspersed with a few hopefully unobtrusive observations of my own. My major misgivings, which do not have a direct bearing on the analysis contained in the survey paper, are outlined in a separate note.

With best regards,

Yours sincerely,

Shahid Yusuf
Public & Private Finance Division
Development Economics Department

The economist's affair with growth is far from over; were it to die we would have lost our most cherished indicator of progress. It was the growth men who held the middle ground during the seminar and their most insistent question was directed towards the impact of the indexing on interest rates and therefore on total savings.

It was suggested that there might be an increase in financial savings with the aggregate level remaining constant. The possibility of such a shift taking place is very real even though there is little evidence of a high savings elasticity with respect to the interest rate. And even on the issue of aggregate savings response, most savings functions which have been computed are based on data drawn from the last twenty-five years and interest rates have generally been low during this stretch in most countries either because of controls or low rates of inflation. It may well be that if we were to reestimate our savings functions using the interest rates now prevailing in the market, the results may be quite different. Of course, some time must pass before the data will be adequate to carry out such a test but a priori it seems plausible to assume that savings would be responsive to very much higher interests which compensated for the inflation and also provided some real return.

But the question then arises: Why use index-linking when flexible interest rates could do the job? That is to say: what is the purpose of introducing additional institutional constraints on borrowing and lending activities when the price mechanism is in theory perfectly capable of handling the problem without the need for external intervention? There is no really satisfactory answer to this. However, it is possible that a financial system optimised for operation at fairly low rates of inflation will need to readjust its practices when there is a dramatic change in the pace of price increase. In fact, there may well be a threshold beyond which a rise in inflation may induce the market to evolve its own index-type rules to deal with the situation, and governmental meddling would be quite unnecessary. The theoretical kernel of this argument seems to me to be the following. The rate of inflation at any given moment of time, be it 2% or 25% is not itself a justification for far reaching institutional modification. I see no reason why financial intermediaries, who are used to low rates of inflation could not cope with a higher 'steady state' rate of inflation although there may be some transactional costs incurred during the transition from one steady state to another. On the other hand, if the move to a regime of higher inflation is going to lead to permanently destabilized expectations on both sides of the market and hence to an increase in uncertainty, then there is every reason to look for institutional innovations that will reduce the variance in expectations and maintain the stability of the market.

The literature on inflation which I have seen does not given any indication of mounting destabilizing pressures in those countries experiencing double figure inflation. Nor is there any reason to fear that high inflation will inevitably lead to hyperinflation and a collapse of the money economy. The econometric studies point to a fairly rapid change in expectations regarding future prices 1/ but there are few signs of expectations becoming destabilized in periods of severe inflation. The design of the tests may have something to do with this result but until someone comes along with different information we must accept the fact that even Latin style inflation need not dent the stability of economic systems.

It is my understanding that the major destabilizing force under these circumstances is the government. It is the latter which continually injects uncertainty into the economy through its occasionally haphazard attempts at bringing down inflation to some loosely defined tolerable level. The government's efforts can certainly distort expectations if they are sufficiently ham-handed and this can impede the functioning of financial markets.

In the past governmental anti-inflationary policy was often determined by balance of payments considerations and pressure from lenders such as the IMF but the era of rigidity in exchange rates is long past and external balance considerations no longer carry the force they once did.

So we are back with the problem: Greater uncertainty arising from unanticipated variations in the rate of inflation may warrant institutional arrangements such as indexing but so long as we cannot show how uncertainty could increase I don't see why the market solution with flexible interest rates should not be considered as a front runner.

Two other questions that were raised appear to me to be quite less important.

1. How are we to decide upon the financial instruments to be covered by indexing? And a corollary to this, can we have indexed and non-indexed financial instruments coexisting side by side?

2. Can indexing in one sector of the economy be feasible even when other sectors remain unaffected?

The answer to the first question is straightforward. If we look upon indexing as a device for lowering market uncertainty, then it should first be introduced into those sectors which are most vulnerable to adverse financial movements and are of strategic importance to the economy. In the US and in the UK housing is one obvious candidate for indexing.

1/ A cautionary note is in order here. Some articles written by Tom Sargent on the effect of expectational factors on interest rates point to very long lags in adjustment with the experience of 17 years ago exercising some influence on present rates. I tend to agree with other authors that the problem resides in the lag structure used. For Latin America (also some recent work for the US by Gibson) the best econometric estimates there are suggest that expectations are formed on the experience of the preceding two to four years.

With the two different categories of financial instruments I again fail to find a serious theoretical conundrum. Firstly and most obviously there can be a risk mark-up added on to the rate charged on unindexed credit instruments. But with a stable rate of inflation, good forecasting on the part of the market participants, and an extensively developed forward market system 1/, there is no reason to believe that non-indexed instruments will suffer in comparison with others. I would go so far as to say that only a limited number of financial transactions need be protected by indexing clauses, if they be protected at all; for the rest, let the market fend for itself. And let the government remember that efficient marketing functioning is impossible without a measure of stability. 2/

As for the second question, all I have to do is point to the existence of disguised forms of indexing such as escalator clauses in wage contracts, which have been in use for years without the rest of the economy converting to indexing as well.

The stability issue arose at a few other points. Some participants claimed that the positive real balance effect of indexing on portfolios could be potentially damaging, depending of course on its magnitude. 3/ Secondly, there may be announcement effects accompanying the introduction of an indexing scheme. Again, I feel this to be second order effect unless there is an asymmetry in the impact of such information combined with a pronounced differential in the bargaining power of borrowers and lenders.

Thirdly, indexing could place an additional burden on the government budget related to the higher cost of servicing the national debt and other short term borrowing. Fourthly, once a comprehensive indexing scheme is in force the government could lose interest in trying to bring inflation under control, because the distributional problem would diminish in importance. The last point is not closely linked to the stability issue but does have some connection.

1/ Of course we cannot blithely assume that these exist in LDCs. And in fact forward markets usually do not. Hence, the criteria developed with the markets of advanced countries in mind cannot easily be used in the financial milieu of the LDCs. Market failure enlarges the role which the government might play and, perhaps, creates a place for innovations such as indexing.

2/ However, when it comes to practice I would like to hang a few qualifications on my assertion. See my note on indexing.

3/ I tend to agree that the real balance, in spite of its fascination for the theorist may not deserve much attention in this context. In my note I preferred to bury it quietly in two paragraphs rather than avoid it altogether.

Other members of the seminar wondered whether the indexing of bonds should cover the principal, or the interest or both, i.e., how must we treat stock and flow effects?

If the principal is adjusted instantaneously with changes in the price level, then further indexing of the interest rate is unnecessary. But this could turn out to be a little cumbersome, in which case the more conventional procedure of merely altering the interest rate would suffice.

Finally, the administrative aspects. Very little reference was made to the mechanics of the index linking system. To me it gives the appearance of a fairly far reaching institutional innovation and one requiring an extensive political and administrative effort so as to arrive at a consensus. I found it most illuminating that Finland considered it preferable to pursue its macro goals by using an incomes policy after having experimented with indexing for quite a long period of time. Of course, I am now taking account of a broader economic terrain than merely the financial sector but it may be illuminating to take a few liberties.

OR-RESEARCH
(INDUSTRIAL CAPACITY UTILIZATION
IN MALAYSIA)

Those listed below October 7, 1974

D. C. Rao, VPD

Panel Review of Research Proposals

A panel consisting of Messrs. Karaosmanoglu (Chairman), Ahluwalia and Carmignani will review the following research proposal on Friday, October 11 at 3:00 p.m. in Room E-723. Mrs. Hughes and Mr. Thoumi will attend.

Title	Proposer
Industrial Capacity Utilization in Malaysia	Thoumi

Copies of the research proposal and the draft report for Malaysia* are enclosed.

The recommendations of the panel should be sent to me by October 15.

Enclosures

Distribution: Mr. Karaosmanoglu
Mr. Ahluwalia
Mr. Carmignani
Mrs. Hughes
Mr. Thoumi

cc: Messrs. B. B. King
Gulhati
Mrs. Hazzah

*Will follow.

DCRao:gm

ITT-15 :

INCOMING CABLE

OP-RESEARCH (R00318)

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USWA CO OBLB 070

LONDONLB TF 70 7 1445 PAGE1/30

Distribution:

Mr. Hubbell
Mr. Gulhati

Oct. 7, 1974

L KENNETH HUBBELL DEVELOPMENT ECONOMICS

DEPT URBAN AND REGIONAL ECONOMICS DIVISION

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

1818 HSTREETNW

WASHINGTONDC(20433)

COLLIN BUCHANAN AND PARTNERS CONFIRM MIKE MOGRIDGE RESIDENT
TRANSPORTATION PLANNER FOR NAIROBI URBAN STUDY WILL BE AVAILABLE
ON NOVEMBER 4TH IN OUR LONDON OFFICE AT 47 PRINCESGATE
SW7 TO DISCUSS

COL 1818 (20433) 4TH 47 SW7

CTB187 KENNETH PAGE2/20

SOCIO ECONOMIC DATA AVAILABLE FROM THE HOME INTERVIEW
SURVEY UNDERTAKEN AS PART OF THE URBAN STUDY

COLLIN BUCHANAN AND PARTNERS

OP-RESEARCH

Mr. Hollis B. Chenery,
Vice President, VPD
D. C. Rao, VPD

October 7, 1974

Research Committee

The attached statement shows the proposed change in the composition of the Research Committee. If you agree, I will prepare letters from you to the new members and invite them to the meeting of the Research Committee on October 21.

Attachment

DCRao:gm

RESEARCH COMMITTEE

Present Members

Chenery
Stern
B. King
Balassa
Karaosmanoglu
Schulmann
van der Tak
Yudelman

New Members

Mrs. Hughes
Lerdau
Thalwitz
Vergin
Waelbroeck

Dropped

H. Adler
Avramovic
Baneth
Gulhati
Qureshi

October 7, 1974

O.P. Research
(Population)

October 4, 1974

Mr. Jeroen K. Van Ginneken
Department of Evaluation and Social Sciences
International Planned Parenthood Federation
18-20 Lower Regent St.
London, SW1Y 4PW
ENGLAND

Dear Mr. Van Ginneken,

with A. Shaw

I was very interested to receive your letter since we are at the moment engaged in assessing research needs in population programs and working towards the drawing up of a list of essential research topics. As you point out the research trend has always been towards demography and if social anthropological research has been mentioned the answer has always been that KAP studies have been done. These studies which have provided so much useful data in the past are always understood to have provided keys to people's attitudes and this mistake has impeded many efforts to introduce behavioral studies into family planning programs. Another inhibiting factor has been that the fund givers have been nervous of research which they see as consisting of long-term studies resulting in large tomes which seldom get beyond the desks of other researchers and thus never influence programs.

But now it is possible, when so many programs are faced with the plateau situation, that more and more countries will turn towards attitude studies as providing a key to people's minds and provide a better understanding for motivational work.

I would be interested in pursuing this subject with you so I have asked Alexander Shaw, our staff communications specialist, to get in touch with you. His work in many countries has made him an advocate of behavioral research and he has discussed the subject with Universities in Singapore and Sri Lanka, with the Korean Institute for Behavioral Studies, with Angela Molnos in Nairobi and London, with the Indian research institutes and with many others. I hope that together you may have a fruitful exchange of ideas.

Thank you for writing me.

Yours sincerely,

K. Kanagaratnam
Director
Population and Nutrition Projects Department

AShaw:sb
Pop. Commun.'s

cc: Mr. Baldwin
Mr. Zaidan
Mr. Kang

ON-RESEARCH
(STANDARDS OF URBAN ELECTRICITY DISTRIBUTION, PHASE II)

Those listed below

October 4, 1974

D. C. Rao, VPD

Panel Review of Research Proposals

A panel consisting of Messrs. Gulhati (Chairman), de Azcarate, Dunkerley and Linn will review the following research proposals on Wednesday, October 16, 1974 at 10:00 a.m. in Room D530. Messrs. Rovani and Sheehan will attend.

Title	Proposer
Standards of Urban Electricity Distribution - Phase II	Sheehan

Copies of the proposal and the State of the Art paper produced in Phase I of this research project are enclosed.

The recommendations of the panel should be sent to me by October 18.

Enclosures

Distribution

Messrs. Gulhati, de Azcarate, Dunkerley, Linn, Rovani, Sheehan

cc: Mr. B. King, Mrs. M. Hazzah

DCRao:gm

WORLD BANK RESEARCH PROGRAM

Project Proposal

Date of Submission: September 24, 1974

SECTION A

PART I. PROJECT IDENTIFICATION

1. Title: STANDARDS OF URBAN ELECTRICITY DISTRIBUTION - RP0267

2. Department Responsible:	3. Staff Member Responsible:
PUBLIC UTILITIES	RICHARD H. SHEEHAN
4. Total Cost (U.S. $):	5. Total Staff Time (manmonths)
US$22,920	Professional: 1 Special Services: ½

PART II. COORDINATION AND APPROVAL

1. Interdepartmental Coordination:

	Department	Name & Signature	Support Project	Do not Support Project-Comments Submitted
a.	Transportation & Urban Projects	Harold B. Dunkerley	as proposed	
b.				
c.				
d.				

2. Approval:

N.A.
Division Chief

(for) Y. Rovani R.H. Sheehan
Department Director

NOTE: Please consult instructions issued August 1973 for completion of this Form and preparation of project narrative.

Do not fill

Date received: _____

Review Panel: _____

PART III. IMPLEMENTATION

1. Date Work to Start: NOVEMBER 1, 1974

2. Date First Draft Expected: April 1, 1974

3. Final Report Due: MAY 1, 1974

4. Implementation Method:

		Names:
a. Bank Staff	/XXXX/	R.H. Sheehan, E. Friedmann
b. Individual Consultants	/ /	
c. LDC Contractor/Institute	/ /	
d. Developed Country Contractor/Institute	/XXXX/	Overseas Consultancy Service of Great Britain
e. Seminar	/XXXX/	Draft and Final Report

5. Reports Expected in the First Year:

PART IV. FINANCIAL AND STAFF DATA

1. Dollar Costs (Estimated Disbursements by Fiscal Year):

	FY 75	FY	FY	After FY	Total
a. Contractual	15,840				
b. Travel	7,080				
c. Data Processing	-				
Total	22,920				

2. Staff Requirements (manmonths):

	FY 75	FY	FY	FY	Total
a. Professional	1				
b. Special Services	½				
Total					

SECTION B: PROJECT DESCRIPTION

I. GENERAL OBJECTIVES

The project is the second stage of a study to determine whether significant reductions can be made in the cost of electricity supply without reducing the benefits to the economy and without substantially increasing the risk of failure. The objective of this stage is to produce Guidelines and a Checklist which will help the Bank and its borrowers identify areas in which economies can be affected in the distribution investment programs and the manner in which they can be carried out. The first stage was completed with the publication in December 1973 of a "state of the art" paper entitled "Investigation into Standards of Urban Electricity Distribution" prepared by the Overseas Consultancy Service of the Electricity Council of Great Britain and with a seminar on Urban Distribution held in the Bank on April 22, 1974. The first stage report concluded that there is in fact considerable scope for improving the cost effectiveness of distribution system design.

II. TECHNICAL ASPECTS

The study would be made by attaching to three Bank power project appraisal missions, a consulting distribution expert who would review the borrower's proposed distribution investment program to identify areas where the engineering design and/or construction can be simplified. The field work would also involve a determination of the cost savings which could be affected by such simplifications, and decide whether the distribution systems are being designed to a standard higher than warranted.

Following the field appraisals, the consultant would prepare broad guidelines which would be used to judge the adequacy of urban electricity distribution plans in terms of cost and quality. The guidelines would present methods of quantifying the benefits of facilities proposed to improve efficiency or to provide operational flexibility. Among the various design features to be investigated are: the need for interconnection of low-voltage radial networks; the use of automatic sectioning equipment to split up the network in the event of faults, rather than the use of reclosers; the optimum timing for the increase in the size of conductors and/or transformers, the amount of standby facilities in medium-voltage networks, etc.

III. ORGANIZATIONAL ASPECTS

The work program would start in November 1974 and be completed in this fiscal year. The field work and the preparation of the guidelines would be done by one or the other of the two experienced distribution system engineers from the South Wales Electricity Board who participated in the first stage. Agreement on the consultant's terms of reference and a review of the draft guidelines would be the function of staff in the Public Utilities Department.

The first country scheduled for a field appraisal is Mexico, to be followed by Iran and possibly by Afghanistan. In each of these countries the local power entity will be expected to prepare a detailed description and cost estimate of its distribution program and to state the criteria on which its design is based. The borrower would also be expected to provide cost estimates for any alternatives which may be suggested by the mission.

At the conclusion of the study a one day seminar would be held in Washington to discuss the principal findings.

IV. DETAILED BUDGET: FY75

Consultant Item	Man-Days	Per Diem Fees	Subtotal	Travel 1/	Total
Preparation Time	10	240	2,400	-	2,400
Mexico Mission	12	240	2,880	1,850	4,730
Office Time	6	240	1,440	-	1,440
Iran Mission	12	240	2,880	1,800	4,680
Office Time	6	240	1,440	-	1,440
Afghanistan Mission	12	240	2,880	2,050	4,880
Final Report and Seminar in Washington (2 people)	8	240	1,920	1,380	3,120
	66		15,840	7,080	22,920

1/ Total travel costs per mission estimated as follows:

Destination	Days	Per Diem	Subtotal	Air Fare Round Trip from London	Total
Mexico	12	45	550	1,300	1,850
Iran	12	55	660	1,140	1,800
Afghanistan	12	45	550	1,500	2,050
Washington (2 men - 2 days each)	4	45	180	1,200	1,380
					7,080

International Bank
for Reconstruction
and Development

Investigation into standards of urban electricity distribution

Submitted by the
South Wales Electricity Board
and The
Electricity Council
under the auspices
of
The Electricity Council's
Overseas Consultancy Service
of
Great Britain

December 1973

THE ELECTRICITY COUNCIL OVERSEAS CONSULTANCY SERVICE

A STATE OF THE ART PAPER

STANDARDS OF URBAN ELECTRICITY DISTRIBUTION

TEAM P. M. PRIOR G. H. BROWN T. A. BOLEY

STANDARDS OF URBAN ELECTRICITY DISTRIBUTION

I INTRODUCTION

1. Electricity has so far played a major role in the development of the World's material resources and in the development of its peoples. With its unique qualities in terms of convenience, flexibility and ease of control electricity is now an indispensable element in the energy economy of all modern societies.

2. To make electricity available to all people is therefore regarded as an important objective to be achieved as quickly as possible. The greatest needs exist in the developing countries where about 40% of their peoples neither contribute significantly to economic growth nor share equitably in economic progress. Hundreds of millions of people are still subjected to conditions of absolute poverty in which basic human necessities are denied.

3. With limited resources available it is essential to optimise their use so that the benefits can be enjoyed by the greatest numbers. To provide electricity to homes, shops and places of work requires distribution systems over which the energy is carried from the bulk sources of power to the customers.

4. In developed countries distribution systems have evolved over the years as a result of various external and internal influences and a succession of judgments often highly subjective. Some of the factors which have influenced development are :-

(a) Economic and political pressures affecting the availability and cost of money for investment in distribution.

(b) State or private ownership of Electricity Supply arrangements.

(c) Electrical load development prospects.

(d) Early decisions on the question of operating voltage.

(e) Outside influences including Government regulations covering the arrangements for electricity supply, the rights of Supply Authorities to install apparatus in public places and the relations to be observed with other bodies such as those concerned with radio and telephone communications.

(f) The philosophy adopted with regard to danger and its prevention including Government legislation.

(g) Associations with equipment manufacturers and the availability and development of appropriate equipment.

(h) The availability of particular material resources such as copper, aluminium, wood poles, etc.

(i) Environmental factors including population density and visual amenity considerations.

(j) Organisation and level of technical competence of the staffs associated with the system.

(k) Pressures resulting from abnormal experiences such as wide-spread failures of supply or extreme weather conditions.

5. This report is concerned with distribution systems which comprise :-

(a) A medium voltage (M.V.) system usually operating at between 10 & 20 kV. although higher and lower voltages are also used.

(b) Distribution substations providing transformation from the M.V. system to a low voltage system.

(c) A low voltage (L.V.) system which might be 3 phase or single phase with operating voltages ranging from 120V single phase to 415V 3 phase.

(d) Service connections from the L.V. system to the consumers' premises.

6. The capital expenditure on these systems amounts to about 40%* of the total investment in electric power systems so that the potential benefits from improvements to the design and construction of such systems are very great. It may be possible by a more quantified design approach and the adoption of new equipment and new construction methods to substantially improve the cost effectiveness of distribution systems. This needs to be considered in relation to the quality of service in terms of continuity of supply and constancy of voltage, also what further savings can be achieved if these standards are relaxed. Some relaxations may be possible without reducing the quality of service beyond that which is either socially tolerable or economic in developing countries. To make rational judgments on this subject some indication is required of the relative values which can be placed on different standards of service. If savings can be achieved in this very capital intensive sector then these savings can be used either to connect more customers or in another sector of the economy altogether.

// how is this done ?

* Distribution investment as a percentage of total capital investment:

ESI (England and Wales)	1972/73	35%
EDF (France)	1972	36%
ENEL (Italy)	1971	43%
RWE (Germany)	1971/72	30%
Investor owned Utilities (USA)	1971	43%

7. The report is based on seven main activities of the team :

(a) A study of the Issues Paper by T. W. Berrie, jr.

(b) Discussions in Washington with staff of the International Bank including those from the Public Utilities Department and those from the Sector Groups covering Eastern Africa; Europe; Middle East and North Africa; Asia; Western Africa; Latin America and the Caribbean.

(c) A search of the published literature.

(d) The individual experiences of the three man team.

(e) A search of the documented practices of Electricity Supply Authorities available in the libraries of the British Electricity Council.

(f) Discussions with Engineers in Great Britain who have visited other countries in connection with distribution system design.

(g) Discussions with Engineers from other Electricity Supply Authorities including :

(a) Potomac Electric Power Company, Washington.

(b) C.F.E. Mexico.

(c) Cia de Luz Fuerza del Centro, Mexico City.

8. Although attention has inevitably been focussed on practices in developed countries, there are a number of lessons which apply equally well in developing countries. These are reviewed in this report but detailed case studies will be required before any firm guide lines can be evolved.

II SUMMARY OF MAIN CONCLUSIONS

9. A summary of the main conclusions together with paragraph references is given below.

System Design

(i) Improved load forecasts can lead to substantial cost reductions (52 and 77).

(ii) Greater use in system design should be made of information gathered for commercial and tariff purposes (53 and 54).

(iii) Mathematical modelling methods have been developed for general system optimisation studies (59).

(iv) There is a tendency towards a reduction in the number of levels of voltage leading to larger primary substations supplying the MV distribution system from a higher voltage HV system (58).

(v) Computer programs available and under development can assist in optimising the design of LV systems (62 and 63).

(vi) Before alternative schemes can be considered it is necessary to establish the basic procedures and economic concepts which are to be used (20 - 22).

(vii) Care must be taken in adopting a technique which is common in one part of the world for use in a very different environment (57).

Continuity of supply

(viii) The majority of consumer interruptions and consumer hours lost occur due to faults on the MV system (29 - 31).

(ix) Computer programs have been developed which can predict the consumer interruptions and consumer hours lost on radial MV circuits (35).

(x) Cost/benefit studies carried out in Britain indicate that investment in MV systems can be reduced whilst maintaining performance (36 - 38).

(xi) There is no economic case for providing interconnection on LV radial systems (41 - 43).

(xii) A reasonable starting point for evaluating system design standards in developed countries can be obtained by valuing undistributed energy due to interruptions at one dollar per kWHour (71).

(xiii) Further study is necessary of the social effect of introducing electricity to the urban poor in developing countries (72).

Constancy of Voltage

(xiv) Distribution systems in urban areas are normally designed so that voltage at consumers' terminals can be maintained within about $\pm 5\%$ of the declared voltage (44).

(xv) Full use should be made of tolerance available by suitable control of MV voltage (45).

(xvi) Voltage tolerance could be increased without severely affecting consumers' apparatus (68).

(xvii) Whilst lower capital cost systems can be obtained by increasing voltage limits the increased losses on such systems may offset these savings (46).

III REVIEW OF CURRENT DISTRIBUTION PRACTICE IN DEVELOPED COUNTRIES

Medium Voltage Systems

10. Medium voltage distribution systems are supplied from the sub-transmission system at primary substations where firm supplies are normally provided, i.e. full supplies can be maintained or restored automatically in the event of a single fault on a transformer at the substation or in the sub-transmission system supplying the substation. Voltages in common use range between 6 and 20kV. but higher and lower voltages are also encountered. Medium voltage systems are mostly operated radially but they usually consist of rings with an open point so that supplies can be restored by manual switching in the event of a fault on any part of the ring. In the simplest case the total load on such a ring cannot exceed the emergency rating of one circuit, but improved circuit utilisation can be achieved by using an unloaded circuit to act as standby to two or more feeders. A sketch of alternative MV system configurations used in urban areas is attached as Appendix A.

11. Three phase 4-wire systems are used almost exclusively in America, but 3-wire systems are more common in Europe. The latter arrangement has the advantage of one less conductor with substantial savings resulting in both overhead and underground systems. In lightly loaded areas, however, where single phase transformation to the low voltage system is adequate, transformers must be connected between phases. This is not of great significance on overhead systems but the 4-wire arrangement enables cheap single core with concentric neutral underground cables to be used in low load density residential areas (U.R.D. System).

12. The medium voltage system is sometimes used to pool capacity between primary substations. This can be effected by providing facilities to switch manually part of the load from one primary substation when a fault results in an overload condition to a neighbouring primary substation.

Alternatively, a number of primary substations which may consist of single transformer installations can be operated in parallel. More recently schemes have been developed using computer based telecontrol schemes to transfer load in the event of faults on primary substations.

Distribution Substations

13. On overhead systems transformers are normally pole mounted with transformer sizes varying from 5kVA. (for a single consumer) up to about 200kVA. In urban areas where overhead pole mounted transformers are unacceptable, cellular substations have been common in Europe with open type air insulated connections to the transformers and isolators to provide sectioning arrangements for the medium voltage feeder. Pressure to reduce the space taken by substations has resulted in the use of metal-clad arrangements with oil immersed ring main units bolted on to the transformer. In this way distribution substations up to 500kVA. or more can be accommodated in small metal or fibre-glass kiosks or, alternatively, accommodated in underground transformer chambers. In the U.R.D. System where single phase medium voltage distribution is used with transformers of up to about 60kVA., plug-in cable connectors have been developed which can be used to sectionalise a faulty circuit.

14. Protection arrangements vary a great deal. Fuses are normally used on the medium voltage side of larger transformers and where these feed several low voltage distributors, these are often separately fused. On smaller transformers where a medium voltage fuse is used, no protection is provided on the low voltage side. Alternatively, small pole mounted transformers may be connected solidly on the medium voltage side with a fuse provided on the low voltage side.

Low Voltage Systems

15. In the centres of large cities "network" systems have been developed where the low voltage circuits between distribution substations are operated interconnected. This involves the use of L.V. circuit breakers at distribution substations to act as network protectors, which open to prevent fault current flowing through the L.V. network for an M.V. cable or line fault. Arrangements to protect the individual circuits in the L.V. network vary from virtually nothing to the wide-spread use of fuses. The former relies on faults burning off whilst the latter often leads to unnecessary shutdowns because of the problem of grading fuses, and a compromise position is normally taken.

16. The advantages claimed for network systems are greater reliability and improved utilsation of distribution substations, sites for which are difficult to obtain in city centres. It is generally agreed that the costs are higher than for a simple radial system but that where load densities are very high the additional cost is not great and is justified because of the advantages. Such systems are unlikely to be appropriate in most developing countries and so this report deals exclusively with radial L.V. systems.

17. Supply arrangements to consumers fall into three basic classes :-

(a) 380 - 415V. three phase or 220 - 240V. single phase.

(b) 220V. three phase or 127V single phase.

(c) 240/120V. single phase 3-wire.

The development of systems for supplying domestic consumers at around 120V. has been on the grounds of safety, but this results in increased conductor sizes being required and, therefore, additional costs, and it is difficult to find evidence that the safety record is any worse where a voltage around 230V. has been adopted.

18. Where the lower voltage distribution is used, small distribution substations must be used serving a limited number of consumers. Where the higher voltage has been adopted, larger substations are normal with a much greater radius of distribution. For this type of system considerable effort has gone into the development of cheaper underground cable systems. The system in common use consists of a three core solid aluminium cable with wave wound concentric neutral and simple jointing arrangements have been developed. More recently a 4 core unscreened solid aluminium cable with cross linked polyethylene (XLPE) insulation is being used on an increasing scale in several European countries (This type now accounts for 53% of all low voltage cable used in the Federal German Republic).

IV EVALUATION OF SYSTEM DESIGNS

19. The objective in the design of a system is to devise a minimum cost arrangement which provides an adequate standard of supply. The design of a distribution system can affect the quality of supply by affecting the continuity of service and the constancy of voltage. Other elements which can be included within the expression "quality of service" such as frequency, flicker, etc. are considered to be outside the scope of this paper as set out in the Issues Paper.

Costing of Schemes

20. Before alternative schemes can be considered, it is necessary to establish the basic procedures and economic concepts which are to be used. Estimates need to be reasonably detailed so that use of generalised figures does not mask local conditions. Discounted cash flow techniques are now widely used in the appraisal of schemes, but the way in which allowances are made for the residual value for equipment changed in the course of development vary widely. Maintenance costs with different types of system

vary a great deal and it is not sufficient to assume a generalised percentage of the capital cost to cover maintenance.

21. Losses can be a very important factor in distribution costs but in practice they are either ignored or assessed very crudely. The costing of losses is a complicated business involving the marginal costing of generation. There is also a wide divergence of views on whether an increased rate of return should be obtained on any additional capital expenditure involved in reducing the cost of losses.

22. Very little has been published on the subject of scheme appraisal and practice as revealed in papers dealing with design principles show many inconsistencies. It is therefore extremely difficult to compare studies carried out in different countries.

Continuity of Supply

23. For many years Supply Engineers have striven to provide a reliable supply with as few interruptions as possible and to restore supplies as quickly as possible in the event of a shutdown. Complex systems were developed with the emphasis on alternative supplies and the provision of adequate switching arrangements. Over the years, however, economic pressures have led to the adoption of simpler distribution systems and, in general, this has taken place without any unacceptable deterioration in the quality of supply.

24. It is only comparatively recently that analytical techniques have been devised for quantifying the continuity of supply. This is because an essential pre-requisite of any of these methods is the collection and analysis of detailed historical information on the number of supply interruptions, the number of consumers affected, the length of interruptions and the causes of interruption etc. and this has become easier with the advent of the computer.

25. The British National Fault & Interruption Reporting Scheme analyses faults in 4 different ways :

(a) By Cause

(b) By faulty equipment and component part

(c) By type of damage

(d) By consumer effect

Automatic logic checks are essential with the volume of data produced by such a computer based centralised system. The standardised fault reporting system ensures that comparisons can be made between Boards and between Districts within a Board.

26. Some of the advantages of such a system, and there are now several similar systems in use or under development throughout the world, are :-

(a) They can identify the causes of faults, e.g. faulty equipment, bad workmanship and wrong practices and often indicate where a considerable improvement in performance can be obtained without a great deal of expenditure.

(b) They can identify those circuits which have a particularly bad history so that detailed investigation can be carried out.

(c) The performance of alternative types of designs of system and plant can be compared objectively.

(d) It is possible to obtain fault rates which can be used to quantify the quality of service to be expected from a given design and determine how this will alter if changes are made to the design.

27. In France detailed information is collected at local level on types of fault, cause, interrupted power, consumers etc. and an edited summary is passed through the management system. They have considerably more detailed data on the equipment in service as compared with the British system, e.g. numbers of different makes, types etc. of equipment, route length of each cable type etc.

28. The detailed computation of equipment fault rates is limited in the EdF system by successive editing of fault details and in the British system by the lack of detailed information of equipment in service. It is probable that by combining the best features of these two systems a comprehensive scheme could be evolved.

29. The following table shows how the various components of a supply system contributes to consumer disturbance measured in terms of the consumer interruptions and consumer hours lost per connected consumer.

Analysis of Consumer Disturbance - Great Britain

(5 year average 1968/9 to 1972/3

	Fault Outages					
	Gen. & Trans-mission System	Sub-Trans-mission System	MV System	LV System	Pre-arranged Outages	Total all Outages
Consumer Interruptions per connected consumer	0.09	0.13	0.52	0.05	0.07	0.86
Consumer Hours lost per connected consumer	0.05	0.12	0.81	0.11	0.24	1.34

30. This table shows the total number of consumer interruptions and consumer hours lost expressed as a function of the connected consumers. These are probably the best overall measures of the consumer disturbance. Availability is sometimes expressed as the percentage of the total duration. 1.34 consumer hours lost per connected consumer can be expressed in this way as an availability of 99.985%.

31. It will be seen that most consumer interruptions and consumer hours lost occur due to faults on the MV system and a similar pattern is evident in other countries. This is as one would expect since :-

(a) It is normal to design Generation, Transmission and Sub-transmission systems so that under normal fault conditions no supplies are lost and so one would expect these figures to be low.

(b) Individual MV circuits are considerably longer and have a greater fault incidence than individual LV circuits.

(c) Many more consumers are affected by each MV fault than each LV fault.

32. Appendix B. shows the design standard currently in use in Britain. This is intended as a guide for use in design and expresses the desired degree of duplication of circuits by reference to the maximum demand of consumers and limitation of outage times. It is intended to be the minima for general use, realising that on the one hand there will be cases where some relaxation will be justifiable for economic reasons, but that there will be loads (such as the central area of large cities) where higher standards are justified.

33. This standard was adopted in 1968 as an interim measure pending fundamental studies of the causes and economics of loss of supply. The main deficiencies are acknowledged to be :-

(a) it contains no statement of target system performance concerning frequency of supply interruptions to consumers.

(b) it does not recognise the variability in fault performance between different types of system.

(c) it contains insufficient guidance on sound reliability investment policies for the Class 1(a) & 1(b) systems.

34. Work is now in progress on the production of a draft code of practice for the Class 1(a) and 1(b) systems i.e. MV systems, to be followed by a revised standard in about two years' time.

35. Despite the fact that it is normal to provide switched alternative MV supplies in urban areas, the majority of consumer interruptions and consumer hours lost occur due to faults on MV systems. For this reason a good deal of effort is now being devoted to cost/benefit studies for these systems. Techniques including computer programs for assessing the likely number and duration of interruptions by relating the fault rates of individual items of equipment to the amount of equipment have been developed. These have been used to examine alternative arrangements so that the benefits in terms of the expected improvement in the quality of service can be compared with the additional capital costs of achieving these improvements.

36. Before definite conclusions can be drawn from these studies it is necessary to decide what value should be placed on the quality of service but it is sometimes possible to reach certain conclusions before this is done. Examples of these are :-

(a) A cheaper scheme may be shown under particular circumstances to give a better performance.

(b) The improvement in performance obtained by a particular proposal may be so small that its cost is obviously not justified.

(c) Conversely the cost of a facility, e.g. auto reclose, may be so small and the improvement in performance so large that its cost is obviously justified.

37. Case studies have been carried out in Britain in which the performance of particular practical circuits, but stripped of all the equipment which has been provided to improve security, have been simulated. The effect of adding back this equipment or changing to alternative arrangements has been assessed with the incremental cost of each stage compared with the improvement in security obtained. These studies are still in progress but they indicate that many practical designs incorporate expenditure on equipment and circuitry which adds little to security and that in some cases a better system could have been obtained for less money.

38. Another study has shown that the cost of improving the performance of a skeletal system to that required to meet the present planning standard is less than $0.03 (£0.01) per kWHr. saved.

39. It is not clear how the use of these techniques will develop but the aim at present appears to be to devise guide lines for use in the design of MV networks relating length and type of circuits, number of consumers and protective arrangements. The enormous number of variables involved, including load density, climatic conditions, equipment and construction practice employed make this task difficult and any conclusions which are reached will not be universally applicable. However, it is clear that techniques are now available which permit system design philosophy to be appraised objectively,

and even extremely simple methods of assessing consumer interruptions have been found useful in correcting attitudes to the question of security and determining local priorities.

40. These can show for example how important it is to separate the circuits feeding out into the rural areas which are often long but supply few consumers from the circuits in the urban area which are short and supply many consumers. A suitable protective device (fuse, sectionaliser etc) at the junction of two such circuits can result in a considerable reduction in consumer interruptions.

41. Low voltage systems are inherently very reliable as is evident in the table on P.13.It is difficult for them to be otherwise because reasonable standards of construction must be adopted to safeguard the public against mechanical or electrical failure and LV circuits must be short to avoid unacceptable voltage drops. Normal practice in Britain has been to employ a radial system with some interconnection sufficient to carry about 30% of the load. The purpose of this interconnection is to permit maintenance to be carried out at off-peak periods without interruptions of supply rather than to cover fault conditions.

42. To reduce costs many Boards have adopted completely radial systems without interconnection on the basis that the modern plant is more reliable and requires less maintenance which can be accommodated in short pre-arranged shutdowns. Overall this does not appear to have reduced the quality of supply since it results in simpler networks which are inherently more reliable.

43. This appears to be the trend in other European countries. In France, radial systems without interconnection are employed except in the centres of certain large towns where a network system is used. Temporary

LV cables have been developed which can be run along the gutter to restore supply in the event of a fault of an LV cable or maintenance of a distribution substation.

Constancy of Voltage.

44. In most countries there are stated limits of voltage variation which are not necessarily legally enforceable but practice in the observance of these regulations varies greatly. They normally specify that voltage variations shall not be more than plus or minus 5 or 10% from the declared voltage although the narrower limits usually apply in urban areas. For example, in France the limits are $\pm$5% in urban areas, $\pm$7.5% in villages and $\pm$10% in other areas. As far as is known, few attempts are made to place "statistical" limits on these variations but one example is Sweden where the average value of voltage over a 24 hour period as well as the absolute maximum and minimum values are considered.

45. Voltage drop in the LV mains and services is often the limiting factor in the design rather than the current carrying capacity of the conductors. In order to obtain economic designs within the adopted voltage limits it is necessary to reduce the voltage variation in the MV system. It is usual to provide on-load tap changers with automatic voltage control on the transformers at primary substations and line drop compensation is often used to raise the MV voltage as the load on the system increases. In Britain it is normal to design for a maximum of 5 or 6% voltage drop in L.V. mains and 2% in services whilst maintaining the voltage at consumers' terminals within $\pm$6% of the declared voltage (240V).

46. Whilst lower capital cost systems can be obtained by increasing the voltage limits without, as discussed later, severely affecting consumers' apparatus, the increased losses on such systems may offset these savings.

This aspect requires detailed study in the particular circumstances as does the increase in flicker voltage which will result from LV circuits being designed for higher voltage drops.

V SYSTEM DESIGN IN PRACTICE

General

47. In practice the planning of distribution systems must take account of local conditions, routes available for cables or overhead lines, levels, the phasing of development and possible future developments. It must, therefore, be carried out by personnel with detailed local knowledge. There is, therefore, the tendency for a broad policy to be laid down by the Central Office of a Supply Undertaking and for the detailed implementation to be left to local planning staff. How well this is carried out depends on :-

(a) The skill of the planning engineer.

(b) How well he understands the design strategy.

(c) The time he has available to study alternative schemes.

(d) Local pressures.

48. It is extremely difficult even within one organisation to measure the quality of the detailed planning and it is only possible to use overall yardsticks such as cost per new dwelling connected and average transformer utilisation achieved.

Estimation of load

49. All system design studies take as their starting point an estimate of the load to be supplied and the estimated future load growth. This is used to determine the size and configuration of a supply system of adequate capacity and one which meets the voltage drop constraints which have been laid down. The provision to be made for future load growth should be

the subject of economic appraisals.

50. Load estimating in developed countries usually depends on a variety of methods such as mathematical time trends, relationships with economic activity indicators and the ownership and usage of equipment. However, such methods generally require large amounts of data, which is not always available, and prove more difficult to use at a local level. In distribution design the demand produced by individual consumers or groups of consumers is of major importance but the problem is that very little actual information is available. In developing countries which are usually experiencing very fast growth in electricity usage, comparisons with experience in similar economic conditions are probably more useful than those forecasting methods based on the ownership and use of equipment e.g. lighting and motive power.

51. Even in developed countries there is very little actual loading information available for the distribution system. The high cost of installing metering equipment to record demand and the subsequent collection of readings prohibit its use except in the larger distribution substations. These substations might be fitted with thermal maximum demand indicators from which some indication of the average after diversity maximum demand (ADMD) can be obtained. In order to design individual services and L.V. lines and cables, it is necessary to make assumptions about the demands of individual and small numbers of consumers. This amounts to a loss of diversity which is allowed for in practice by the use of a simple formula, the form of which varies widely.

52. Accurate load forecasting is clearly as important in distribution system design as in any other supply systems study, but because of the difficulties, designs are often based on a series of arbitrary assumptions.

Where demands are underestimated this becomes apparent when poor voltage conditions are experienced. Over-design is, however, masked by the lack of loading information on distribution systems and because of this it is suspected that Engineers tend to base their designs on an over-estimate of the load to be supplied. This certainly appears to be the case in Britain where the utilisation factor for distribution transformers averages between 60 and 70%, whereas analytical studies have shown that the optimum utilisation with British load cycles etc. is around 80%. Studies have also been carried out on actual Housing Estates completed a few years ago which show that cost savings of around 15% would have been made if the demands could have been more accurately forecast.

53. Many surveys have been carried out using portable data logging equipment in an attempt to improve knowledge on the loading of distribution systems. Such surveys are, however, expensive and the results have only a limited application. In recent years, therefore, attention has been directed to the use of consumer billing information to indicate system loading. A record of individual consumer's consumption is generally available on a computer file and if a file is also established referencing each consumer to the L.V. cable or line and distribution transformer from which he is supplied, it is possible to extract figures for the kilowatt hours supplied at any point on the distribution system. Formulae have been devised to relate units (kWh) to maximum demand and very close correlation is claimed. This technique will undoubtedly be used widely in the future to provide information on loadings on the MV and LV systems and should provide more satisfactory information on which future designs can be based.

54. A good deal of information is normally available from consumers unit consumption patterns from commercial studies used for the design of tariffs but this is seldom used in system design. There would appear, therefore, to be merit in basing future designs on estimates of

units rather than demand with a concentration of effort into the improvement of methods of correlating units to demand and to time of day. In this way it should be possible to take account of such factors as size of property, social group of occupants, availability of other fuels, likely initial and future uses of electricity etc., many of which are often ignored at present.

Choice of type of distribution system

55. Section III of this report has indicated the wide variation in distribution practices and the choice of practice in a particular situation has a major effect both on costs and standard of supply. In most cases the choice is normally restricted due to the following factors :-

(a) The existing systems.

(b) Availability of local manufacturing facilities and access to international markets.

(c) Frequency employed - portable electrical equipment designed to work on 60 hertz is normally also designed for around 125V.

(d) The availability and cost of skilled and unskilled labour.

(e) Environmental pressures affecting the choice between overhead and underground distribution.

56. Existing patterns of distribution system must, however, be re-examined periodically to determine if major changes are desirable to improve reliability, enhance appearance or reduce costs. This must be carried out objectively taking care to avoid being unduly influenced by isolated experiences. Long range studies are necessary to examine the consequence of the very gradual changes which are all that are possible in distribution systems in practice since the high initial cost of establishing new patterns often postpones any possible economic benefit for many years after starting the program.

57. An example where a completely new pattern of development has been devised to meet a changing situation is the underground residential development (URD) system in America. This development took place as a result of pressures to place more of the distribution system underground and completely new techniques have been developed uninhibited by previous practices. The widespread adoption of these techniques in America suggests that they are ideally suited to American conditions. Studies have shown, however, that there are no advantages in using this system in Britain where housing densitites are higher, consumer voltages higher, and three-wire M.V. distribution is used. Care must clearly be taken in adopting a technique which is common in one part of the world for use in a very different environment.

58. The results of many long term studies into the overall design of systems for urban areas have been published and these show a trend towards the elimination of intermediate voltage levels and a reduction in the amount of HV switchgear. Examples of these are as follows :-

(a) Paris - the use of direct transformation from 220kV. to 20kV. and from 20kV direct to 380/220V. This system will be based on the use of single 220/20kV. transformer substations with interconnection provided over the 20kV. system using a computer based control system.

(b) Hamburg - increasing use will be made of direct transformation from 110kV. to 10kV. with the gradual phasing out of the existing 25kV. system.

(c) Dublin - a standardised scheme for gradually replacing the existing 38/10kV. substations by 110/10kV. substations has been prepared.

59. In Britain mathematical modelling methods have been used to

undertake system optimisation studies. These studies are still in progress but among the conclusions so far reached are that economies could be achieved by reducing the number of voltage levels and increasing the size of substations. These techniques could be particularly useful in developing countries where new systems have to be established.

System Design

60. Even when a given pattern of development has been decided, there remains a vast number of variables which affect cost and performance. In the case of the L.V. system, for any given situation there is an optimum size and spacing for substations which depends on the relative costs of substations and L.V. cables or lines. It is dependent on load density, load growth, voltage constraints and whether the distribution is overhead or underground. In these calculations allowances must be made for unbalance between phases on 3-phase circuits and there is a wide divergence of views on what this allowance should be.

61. A detailed study of all these factors, together with losses is clearly impossible for the design of individual schemes and it is, therefore, normal to carry out analytical studies on theoretical networks to produce a series of guide lines. These might include :-

(a) Choice of size of service connection conductor as a function of consumer load and distance.

(b) Use of individual service connections or loop connections between consumers.

(c) Range of L.V. conductors to be used. This is normally limited to three or four sizes but some utilities standardise on one size.

(d) Use of uniform conductor size or conductors with gradually decreasing cross section. The latter are generally considered unsatisfactory where load is unpredictable or a high rate of growth is expected.

(e) Optimum spacing between substations as a function of load density.

(f) The extent to which design should cater for future development.

It is easier to increase conductor size with overhead installations than with underground systems but future savings can be achieved with the latter if the initial system is laid out with future reinforcement in mind.

(g) Range of distribution transformers to be used.

(h) Size of transformer to be installed as a function of initial load and load growth. Guidance might also be given on the optimum load for the change of a transformer.

62. The application of these guide lines to a practical situation is time consuming if a serious attempt is made to produce an optimum design. Computer programs have therefore been developed which calculate the size of L.V. cables or lines required to satisfy the voltage constraints imposed and estimate the cost of a scheme. Such programs reduce the time taken in hand calculations and allow a number of alternative schemes to be considered. More recently in Britain a computational technique has been developed that aims not only to decide on cable lengths and size but also tackles the more difficult problem of deriving an optimal cable layout. The method is based on a route finding algorithm which it is claimed produces consistently good designs with a small amount of data preparation and computing time.

63. In France a study is in progress to develop a dynamic method for studying distribution systems for new housing estates. The aim is to devise a computer method for determining the optimum number, size and location of MV/LV substations, the layout and size of LV cables and the future reinforcement strategy.

VI SOCIAL AND ECONOMIC CONSEQUENCES OF VARYING QUALITY OF SERVICE

64. The two most important aspects of quality of supply are its continuity and voltage regularity, both of which are affected by the design of the distribution system. As mentioned previously, electricity suppliers have usually striven to provide a supply with as few interruptions as possible but economic pressures in all countries have resulted in less reliable supplies outside urban areas. Detailed measurements of supply continuity have only in recent years been collected even in developed countries such as France, Great Britain, Sweden, West Germany and the United States. These measures of continuity are the result of system design based on criteria adopted by the supply undertaking and not specified by government legislation. The criteria usually relate to the number of circuits supplying defined blocks of load and will have evolved over time as a result of economic and social pressures on the supply undertaking and its customers.

65. In developed countries the geographical mix of customers of various types e.g. domestic, commercial and industrial, and their dependence on electricity is such that it is not economically feasible to provide differing standards of supply quality to every customer. Special supply arrangements are made for industrial customers where the industrial process could be severely disrupted by an interruption e.g. aluminium smelting, but the extra cost of these arrangements should be reflected in the tariff or borne directly by the customer rather than spread across all other customers. In such cases of essential loads, in which hospitals could be included, it may be more economical to achieve high reliability by the consumer providing an emergency generator rather than the supply undertaking providing a 'firm' supply.

66. The social and economic consequences of supply interruptions and voltage fluctuations differ by type of customer. Industrial customers are affected by both aspects of quality and the economic severity increases with the length of time of interruption. In many cases output lost during an interruption can be recovered but at an additional cost in terms of labour, however, further costs may also be occasioned by equipment and material damage and cleansing operations. It is also clear that the effect upon consumers of an interruption is greatly influenced by the time of day and at what period of the year it occurs. In Western Europe, for example, interruptions at night for periods of one to two hours are unlikely to have much effect for all but a few industrial customers whereas those occurring during the day in the winter months cause a maximum of inconvenience. In more tropical climates, the maximum inconvenience would be more likely during the day in summer months due to the fan, air-conditioning and refrigeration loads.

67. Interruption of supplies to shops, offices and small businesses disrupt normal activity, although in most cases the lost ouput can be recovered at a later stage.

68. Loss of supplies to domestic customers disrupts home activity but direct economic consequences are small. Loss of lighting is extremely disruptive outside the hours of daylight and cooking operations may be ruined. Space and water heating have an inbuilt thermal inertia which enables short interruptions to be ignored but after half-an-hour or so, an environment dependent on direct-acting heating will show a deterioration in comfort conditions. Similarly domestic refrigerators will experience internal temperature rise after a short time but deep freezers, particularly if full, will not be seriously affected for several hours. After that, financial losses

of spoilt food could be quite substantial for those customers with such an appliance. Lack of voltage regularity is generally only noticeable on lighting and particularly, television. However, problems relating to television picture size etc. can be minimised by inbuilt voltage regulators as specified in Sweden rather than by the expenditure of large sums of money by the supply undertaking.

Economic valuation of supply quality

69. Valuation of supply quality has generally been approached from two viewpoints in recent years but both are more concerned with marginal changes in conditions rather than an assessment of the standard to be set originally. The first viewpoint is based on the distribution system as it presently exists and compares the quality of service with that which could be achieved by minor changes to the system. The costs incurred (or saved) by such changes are then compared to the change in the quality of service. For example, French studies of urban distribution systems have indicated that present system techniques imply a value of $1.20(5F) for each kWh not supplied. In Great Britain, computer programs utilising the information from the National Fault and Interruption Reporting Scheme have been discussed earlier. These enable typical distribution configurations to be examined and the costs involved in changes to these to be related to the supply interruptions expected. These studies also indicate that continued investment beyond $1.20(£0.50) per kWh not supplied produces little change in supply continuity.

70. The alternative approach is to value undistributed energy from the consumers' viewpoint, that's how much would he be prepared to pay to avoid an interruption. This approach has been attempted at two levels, namely,by asking individuals and by broad macro-economic assessments. This work appears to have been concentrated in Sweden, France, Great Britain,

Germany and various East European countries. The approach to individuals by using a questionnaire has been tackled in France for domestic customers and by Great Britain, Germany and others for industrial customers with perhaps the most comprehensive survey having been carried out in Sweden. Individual replies vary as expected, due to the particular circumstances of the customer but it is clear that domestic customers, even more than industrial ones, have great difficulty in assessing the cost or disbenefit suffered through a supply interruption. The broad macro-economic assessment has generally been based on electricity's contribution to output or on a labour payment evaluation. All these assessments are subject to major assumptions concerning lost production, time to restart production, valuation of leisure time for example, but they give results in the range of $0.50 to 1.20 (£0.50/5F/0.4 roubles/3 DM).

71. Whilst accepting the limitations of the two approaches it seems clear that a reasonable starting-point for evaluating overall system design standard in developed countries can be obtained by valuing undistributed energy due to interruptions at one dollar per kWh. This valuation can be repeated for developing countries to ascertain whether the same order of magnitude applies. Detailed system designs to cater for individual industrial customers should continue, of course, to be evaluated on the likely benefits and costs applicable to the particular situation.

basis for estimate ? for LDCs ?

Social Consequences

72. It is generally considered inappropriate to carry out economic assessments of supply quality where interruptions involve danger to human life or could provoke social disturbances although such valuations have been made in other fields of activity. A more general question in developing countries is the social effect of introducing electricity for lighting and small motive power purposes and the resulting economic consequences in terms

of productivity and output. Whilst reduction in supply quality to existing urban consumers can be valued at the appropriate marginal rate it seems intuitively clear that the multiple effect of new consumers would be above this marginal rate. However no evidence has been found of such evaluations and this must be studied further.

VII CONCLUSIONS AND RECOMMENDATIONS

73. Limitations on time and resources have made it necessary to concentrate attention on developed countries where the "State of the Art" of distribution system design is well documented. However it is considered that a number of lessons can be learnt which are applicable to developing countries and in particular it should be possible to avoid repeating some of the mistakes which have been made.

74. Distribution systems employed today have evolved over a large number of years as a result of the inter-action of many factors and the wide variations in practice show how complex this process has been. The result is that developed countries are usually concerned with the extension or adaption of an existing system whereas there should be greater opportunity to design the system to the real needs in a developing country. There are great incentives for a country which is already at an advanced state of development and where subsequent expansion is likely to be relatively slow to be more scientific in its approach to development. This has been the position in Europe where in recent years there has been a concentrated effort on reducing the cost of distribution systems. The advent of the computer has been an important factor but so has the increasing competition from other fuels. Many basic concepts have been challenged and quantification is now required for facilities previously provided to "improve security" or to "provide operational flexibility". There has been a determined effort to identify

objectives more clearly and the need for these to be properly understood has been appreciated.

75. The objectives, the requirements and therefore the solutions will be different in a developing country but many of the techniques which have been devised can be adapted and applied. Wherever innovations are attempted, however, there is the problem of prejudice to be overcome and a good deal of re-education has to be carried out. This may be a particular problem in developing countries where in any case there is usually a shortage of skilled design engineers and many of these have received their training several years ago in a different environment and before the new design techniques were established. There is,thus,a greater incentive to harness the power of the computer and it could well be that the developing countries will give a lead in this field.

76. The general conclusion which has been reached is that there is considerable scope for improving the cost effectiveness of distribution system design without any appreciable lowering of the standard of supply. The standard of reliability of supply of a distribution system is inherently very high,particularly in urban areas where distances are short. It is therefore necessary to appraise carefully all the facilities installed to improve security of supply and consider whether they can be justified. It is likely that this will show that LV networks should be purely radial without interconnection. In fact, the elimination of link boxes etc. may well improve security. There is probably justification for providing limited standby facilities in MV systems but each case should be considered on its merits. It may be better to spend money on splitting up the network with automatic sectioning equipment to reduce the number of consumers affected by a fault rather than in providing standby facilities to restore supplies in the event of a fault.

77. A more significant reduction in costs can be made if better forecasts can be made of the initial load and load growth to be expected on distribution networks. Although it may be possible to increase the range of permitted voltage variation up to about $\pm$10% without causing undue inconvenience to consumers it should first be ascertained that full use is being made of a smaller range and that any increase will not increase costs due to increased losses.

RECOMMENDATIONS

78. Our recommendations on the future work are as follows :-

(a) Guide Lines: There is clearly a need for two sets of guide lines, one of which could be issued to borrowers indicating the sort of information which should be submitted with loan applications and another for use by the Bank's operating divisions when judging the effectiveness in terms of cost and quality of urban electricity distribution plans. These are unlikely to be simple because of the differing circumstances in which they will have to be applied. A good deal of work will be required before these can be produced.

(b) Case Studies : In order to assist in the formulation of the guide lines, a number of case studies should be carried out preferably by various consultants. This will be an opportunity to test some of the techniques discussed in this paper and will confirm the more important areas where savings can be made. It will be necessary to adapt the techniques before they can be applied and this could involve an element of research.

(c) Questionnaire : To help in the assessment of the case studies it would be useful to obtain a rough indication of current practices in a number of devloping countries. It is therefore recommended that a questionnaire be completed by Bank personnel covering,initially,one project which has recently been completed in each of the Bank's operating divisions. (A draft questionnaire is attached as Appendix D).

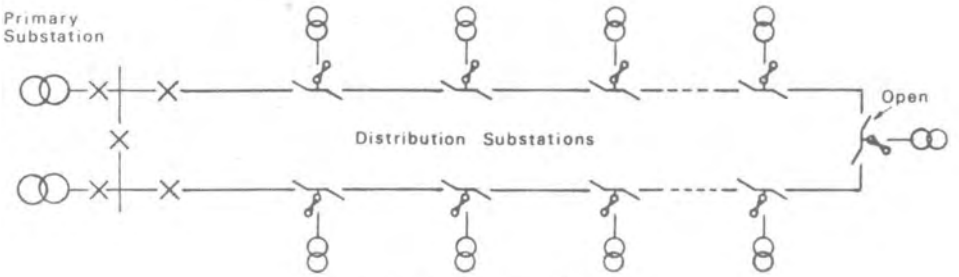
Is this being done?

(d) Seminars : Because the techniques used in distribution system design have developed considerably during the last few years there may be merit in arranging a Seminar in Washington for the discussion of this subject. The Bank may consider that more than one approach to the subject should be presented at such a Seminar. It is envisaged that this would be in addition to the short presentation which the authors will make when their report is discussed.

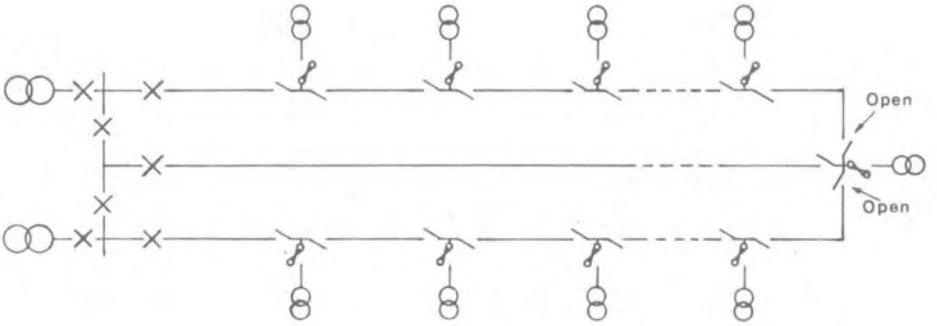
been done?

APPENDIX 'A'

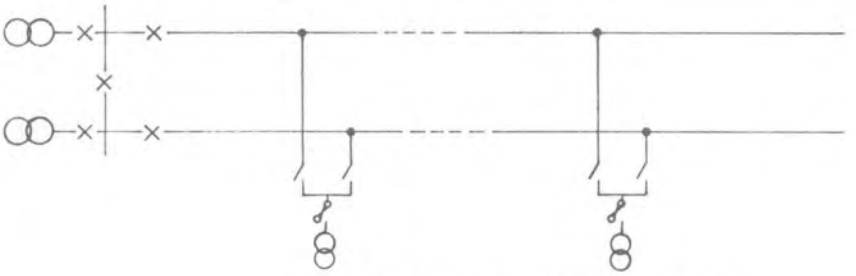
M.V System configurations used in urban areas



(a) Simple ring with open point



(b) Spare cable as standby to two cables



(c) Double derivation arrangement (E.D.F.)

APPENDIX B

INTERIM SECURITY STANDARD - GREAT BRITAIN

Class of Supply	Range of Group Demand MW	Minimum No.of Supply Circuits Normally Available.	Demand to be met immediately after :-		Target Time for the Restoration of Full Group Demand (Note B)	Notes
			First Circuit Outage (Note A)	Second Circuit Outage (Note A)		
					For First Circuit Outage	
1a	Up to 1	1	Nil	-	Repair Time	C
1b	Over 1 to 8	1	Nil	-	2 hours	
1c	Over 8 to 24	1	Nil	-	15 minutes	
					For Second Circuit Outage	
2a	Over 24 to 80	2	Group Demand	Nil	Repair Time for one circuit.	D
2b	Over 80 to 300	2	Group Demand	Nil	Repair Time for one circuit for full group demand, but 1/3rd group demand in 2 hours.	D
3	Over 300	3	Group Demand	All consumers at 75% Group Demand	Repair time for one circuit.	E.F.G.

NOTES:

A. In order to allow one or more of the circuits supplying a Group Demand to supply a part of that Demand i.e. a smaller Group Demand en route, the Group Demand to be met immediately after the outage of such a circuit or circuits may be reduced by one, and only one, such smaller Group Demand lost directly on account of the outage, provided that the whole of the smaller Group Demand can be restored within the time appropriate to its class.

B. The target restoration times are associated with switching methods as follows :-

15 minutes - switching by direct or supervisory control from attended control points

2 hours - switching by direct or supervisory control from normally unattended control points.

C. Where the demand is supplied over a single 1000 kVA transformer the "Range of Demand" may be extended to cover the overload capacity of that transformer.

D. In Classes 2a and 2b both circuits normally available should normally be closed. Exceptions may be made when, for fault level or other considerations, it is necessary to operate the lower voltage bus-bars in two sections provided that automatic switching is provided to restore the supply and a loss of supply not exceeding 30 seconds is acceptable after the first circuit outage.

E. In Class 3 generators may be considered as the third or subsequent circuit up to the capacity of the firm generation.

F. In Class 3, when required for fault level or other considerations, one circuit may be on automatic standby provided that the loss of one of the remaining circuits will not cause the group to come out of parallel.

G. For planning purposes it is assumed that an arranged circuit outage will be avoided when the consumer demand exceeds 75% of the Group Demand.

APPENDIX C

PERMITTED LIMITS OF VOLTAGE (AND FREQUENCY) VARIATIONS

GREAT BRITAIN	The Electricity Supply Regulations 1937 which are mandatary on the British Electricity Boards require that frequency variations should be limited to $\pm$1% of the declared frequency and that voltage variations should be limited to $\pm$6% of the declared voltage.
U.S.A.	There are no legal requirements or specific limits for voltage and frequency fluctuations but the general nationally recognised limit for voltage fluctuation is $\pm$5%. Frequency fluctuation is very small, for details applicable in the separate states, see state digests.
BELGIUM	The Royal Decree of 11 February 1927 restricts variations of the instantaneous voltage at a given place to $\pm$5% of the nominal value of the voltage at that place during daylight and $\pm$10% during the hours of darkness. In practice the voltage is normally maintained within $\pm$5% in towns and $\pm$10% in outlying areas. The decree also stipulates a tolerance on the variation of frequency of $\pm$3% of the nominal value, but in practice the variation is generally less than $\pm$0.4%.
FRANCE	The voltage and frequency fluctuations of the public electricity supply are the subject of government decree of 22 November 1960. This decree requires the voltage of the high voltage networks to be maintained within $\pm$7% of the declared voltage at the point of use. Frequency fluctuation rarely exceeds $\pm$2%. For low voltage networks the limiting values are at present under review and are likely to be defined on the basis of the population density in particular areas.
NORWAY	There are no legal requirements for the limits of voltage or frequency fluctuations. In general voltages are maintained within $\pm$5% in large towns and $\pm$ 10% in country areas. Frequency fluctuations are negligible.
POLAND	There are legal requirements for the limits of voltage and frequency fluctuations given in the ministerial authorisation for the Electricity Supply Union. This authorisation permits voltage fluctuations of $\pm$5% in the cities and towns and $\pm$5% to 10% in rural areas. These limits are normally maintained but in some remote areas may be exceeded. Frequency fluctuation of $\pm$ 1 Hz is permitted but in practice fluctuation is negligible.

SOUTH AFRICA	The general practice is to maintain the voltage fluctuation to within $\pm 7\frac{1}{2}\%$ of the declared voltage and the frequency to within $\pm 0.5\%$.
SWEDEN	There are no legal requirements for the limits of voltage fluctuation but the Association of Electricity Supply Undertakings recommends that fluctuations should not exceed $\pm 10\%$, but a figure of $\pm 5\%$ is generally considered more desirable. In practice voltage supplies to some outlying districts may be outside these tolerances because of the long distribution lines but this situation is being improved. Frequency fluctuation is very small; less than 0.2% is normal.
WEST GERMANY	There are no legal requirements for the specific limits of voltage or frequency fluctuation, but the general regulations for the supply of electricity require the voltage and frequency to be maintained at a constant level as far as possible. The aim is to maintain voltage fluctuations within $\pm 5\%$. In practice, the supply voltage to some outlying districts may be outside these tolerances because of the long distribution lines. Frequency fluctuation is very small; less than 0.2% is normal.

NOTE :- The above information with the exception of that for Great Britain has been extracted from the BRITISH STANDARDS INSTITUTION "TECHNICAL DIGESTS".

QUESTIONNAIRE ON URBAN ELECTRICITY DISTRIBUTION

OBJECT:- To obtain preliminary information on current distribution practices and the methods used to design systems in a number of developing countries.

METHOD:- This questionnaire should be completed by Bank personnel covering initially one project which has recently been completed in each of the Bank's Operating Divisions.

1. PROJECT:- Name.....

Utility and Country.....

Area of project (hectares).....

No. of premises.....Type.....

Date of design.....Date of Construction.....

2. LOAD DATA:- Basis of design study (initial load and growth estimate).....

.....

Actual maximum load readings with dates (e.g. transformers, distributors).....

.....

Actual annual unit consumption per consumer with dates.....

.....

3. VOLTAGE CONTROL:-

Legal limits of voltage fluctuation.....

Practical limits of voltage fluctuation.....

Arrangements for control of MV system voltage.....

.....

4. TRANSFORMERS:-

Number of each size used in project.....

.....

5. L.V. SYSTEM:-

Voltage.....Overhead or Underground.....

No. of phases.....No. of conductors.....

Size of conductors.....Material used for conductors.....

Type (e.g. radial with/without interconnection).....

.....

Design Voltage Limits.....

.....

Protection arrangements.....

.....

6. H.V. SYSTEM:-

Voltage.....Overhead or Underground.....

No. of phases.....No. of conductors.....

Size of conductors.....Material used for conductors.....

Type.....

.....

Protection arrangements.....

.....

Distance between primary substations providing supply
from sub-transmission system (kilometres).....

7. SERVICE CONNECTIONS:-

Voltage.....Overhead of Underground.....

No. of phases.....No. of conductors.....

Size of conductors.....Material used for conductors.....

Type (e.g. individual or looped).....

.....

8. OPERATING EXPERIENCE:-

(e.g. Consumer-hours without supply, Consumer-Interruptions etc.)

.....

.....

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OP-RESEARCH
(RPO #290)

Form No. 27
(3-70)

INTERNATIONAL DEVELOPMENT ASSOCIATION | INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT | INTERNATIONAL FINANCE CORPORATION

OUTGOING WIRE

TO: Prof. Jose Birchal Wanderley
CEDEPLAR
Rua Curitiba 832 Belo Horizonte 30000
Minas Gerais
BRAZIL

DATE: October 4, 1974

CLASS OF SERVICE: LT/NT Night Letter/2127

COUNTRY: Brazil

TEXT:
Cable No.:

Bank economist Mr. Jeurling will visit CEDEPLAR between October 14-18 to discuss possible new research project STOP Please give him all correspondence documents and information on labor market research you have STOP Thank you STOP

Best Regards

Anna M. Sant'Anna

NOT TO BE TRANSMITTED

AUTHORIZED BY:

NAME Mr. Douglas H. Keare, Chief, ECDRB

DEPT. Development Economics

SIGNATURE Douglas H. Keare
(SIGNATURE OF INDIVIDUAL AUTHORIZED TO APPROVE)

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OP-RESEARCH
(SIMULATION OF BUFFER STOCKS)

Those listed below October 3, 1974

D. C. Rao, VPD

Panel Review of Research Proposals

A panel consisting of Messrs. Balassa (Chairman), Basil Kavalsky, Roger Norton, Shamsher Singh and Jean Waelbroeck will review the following research proposals on Friday, October 11 at 10:00 a.m. in Room N-236. Messrs. C. Bruce, A. Egbert and S. Reutlinger will attend.

Title	Proposers
Raising the Productivity of Small Farms	Bruce/Egbert
Simulation of Buffer Stocks	Reutlinger

Copies of the research proposals are attached.

The recommendations of the panel should be sent to me by October 15.

Attachments

Distribution

Messrs. Balassa, Kavalsky, Norton, Singh, Waelbroeck, Bruce, Egbert, Reutlinger

cc: Messrs. B. King, Yudelman, Gulhati, Mrs. Hazzah

DCRao:gm

WORLD BANK RESEARCH PROGRAM

Project Proposal

of Submission: September 20, 1974

SECTION A

PART I. PROJECT IDENTIFICATION

itle: Simulation of Buffer Stocks

epartment Responsible: Development Economics	3. Staff Member Responsible: Shlomo Reutlinger
otal Cost (U.S. $): 12,500	5. Total Staff Time (manmonths) Professional: 3 Special Services:

PART II. COORDINATION AND APPROVAL

nterdepartmental Coordination:

	Department	Name & Signature	Support Project	Do not Support Project-Comments Submitted
a.	Latin America, OVP	D. Avramovic		
b.	South Asia-Projects	Dorris Brown		
c.	Agriculture	M. Yudelman		
d.	EPD	S. Singh		

Approval:

Division Chief

Department Director

E: Please consult instructions issued August 1973 for completion of this Form and preparation of project narrative.

Do not fill

Date received:

Review Panel:

PART III. IMPLEMENTATION

1. Date Work to Start: January 1975 2. Date First Draft Expected: Oct. 1975

3. Final Report Due: December 1975

4. Implementation Method: Names:

a. Bank Staff . . . . . /X/ S. Reutlinger

b. Individual Consultants . . . . . /X/

c. LDC Contractor/Institute . . . . . /X/

d. Developed Country Contractor/Institute/X/

e. Seminar. . . . . /X/

5. Reports Expected in the First Year:

PART IV. FINANCIAL AND STAFF DATA

1. Dollar Costs (Estimated Disbursements by Fiscal Year):

	FY' 75	FY' 76	FY	After FY	Total
a. Contractual	4,000	2,000			6,000
b. Travel		1,500			1,500
c. Data Processing	3,000	2,000			5,000
Total	7,000	5,500			12,500

2. Staff Requirements (manmonths):

	FY '75	FY '76	FY	FY	Total
a. Professional	2	1			3
b. Special Services					
Total	2	1			3

Research Proposal

Simulation Models for Evaluating
Food Grain Buffer Stock Programs

I. General Objectives and Strategy

(a) Background and General Objectives

Recent country and worldwide foodgrain shortages resulting from unfavorable climatic conditions and unusually high foodgrain prices related to both unfavorable supply conditions and international financial and trade upheavals draw renewed attention to the need for stabilization policies. Under conditions of expected random fluctuations in supply or demand, which characterize particularly agricultural commodities, buffer stock operations can be expected to have important economic benefits. However, it is important to quantify these benefits in relation to costs because costs rise rapidly with increasing levels of storage operations. The object of such calculations is to approximate the level of storage operations at which benefits exceed costs.

In the absence of clear conceptual models for calculating the benefits and costs of storage operations, unfounded claims are often made for excessive investment in buffer stocks, and alternative measures which would be less costly and more effective in stabilizing commodity markets do not receive sufficient attention. Reserve stocks are advocated as an answer to anything from a declining trend of per capita food availability and even more peculiarly for an increasing trend of per capita food supplies and lower food prices to preventing starvation of particularly vulnerable populations. To a limited extent, the advocacy of excessive storage operations than economically justified is grounded in partisan politically considerations. It seems more acceptable to ask taxpayers to fund storage operations than to legislate for income transfers. However, to a considerable extent, the reason for advocating excessive storage levels is the difficulty of calculating the full costs. The costs are distributed over many years, whereas the benefits are highly concentrated and visible.

(b) Strategy

The proposed research will concentrate at the outset on the structuring of conceptual models by which approximate storage benefits and costs can be easily simulated for a particular country. Some simulations will be made to estimate the range of costs and benefits under different assumptions about program objectives, supply fluctuations, demand elasticities and import and export prices. At the same time an outline will be developed for research required to evaluate international buffer stock operations.

The reasons for focusing first on country rather than world-wide storage models are several. A world-wide coordinated storage policy would be a lower cost solution to supply fluctuations than each country buffering against fluctuations, provided that grain were traded freely without barriers

among countries and storage decisions would be made internationally with a view toward maximizing world income. Clearly both provisions are inconsistent with a realistic assessment of current international relations. Contrary wise, it is reasonable to expect that multi-national storage agreements might be feasible with various constellations of the distribution of costs and benefits among participating countries. The linking of several country models is likely to provide a better means for assessing such arrangements than a single world-wide optimization model.

The main reason for concentrating in the first phase of this research on country models is that the World Bank is likely to receive an increasing number of requests for storage investments and should be therefore in a position to evaluate the costs and benefits to a particular country.

II. Technical Aspects

The author of this research project has advocated a simulation model for evaluating buffer stock programs in 1970. 1/ While a simulation model of this kind does not yield optimum storage rules, the simulation model can be used to approximate optimum storage capacity assuming simple to follow storage rules which are likely to be adopted in practical storage management. The model is also extremely flexible for taking into account different policy objectives and assumptions about interest rates, probability distributions and shapes of demand functions. The model can also simulate a large number of parameters of interest to policymakers, such as the expected reduction in price fluctuations and the net gains or losses to consumers, producers and the public storage authority (see attached paper).

Several modifications in the earlier model will be specified and analyzed in the proposed work, as follows:

(i) A kink in the demand function expected to occur as a result of pursuing a policy of supplying a minimally acceptable amount of food grains to the entire population.
(ii) An upper and lower price limit corresponding to import and export prices.
(iii) Random fluctuations in import and export prices superimposed on random fluctuations in domestic supply.
(iv) A positive correlation between domestic supply levels and world price.
(v) Revision of expected range of prices and simulation with a wider range of demand elasticities and probability distributions of supply.

The research project will also include a review of empirical supply and demand data in selected developing countries.

1/ Shlomo Reutlinger: A Simulation Model for Evaluating Buffer Stock Programs, 1971, in Symposium on Food Grain Marketing in Asia.

III. Organizational Aspects

The research proposed at this stage will be completed by September 1975. An interim output will be available in the spring of 1975, including an outline for a further work dealing with multi-national storage arrangements.

IV. Budget

Staff time: 3 months

The major budget costs are for (a) a research assistant to program the models and run computer computations and review of relevant data (b) computer cost and (c) travel to consult with other researchers and organizations currently working the subject.

CHAPTER X

A SIMULATION MODEL FOR EVALUATING BUFFER STOCK PROGRAMS

Shlomo Reutlinger

INTRODUCTION *

1. Growth in output of food grains and potential self-sufficiency in food grain supplies in a number of developing countries have stimulated a lively interest in large investment in grain storage facilities. The only kind of storage function considered in this chapter is year-to-year storage which is motivated by a desire to reduce fluctuations in consumption in the face of unpredictable annual fluctuations in grain supplies. Buffer stocks are defined as those quantities of grain withdrawn from consumption when production happens to be unusually plentiful and re-introduced into the market when harvests happens to be less than normal.[1]

2. Unlike Joseph in Egypt, 2,500 years ago, the modern-day planner has no prophetic insights which would make it possible for him to predict production in any particular future year. Instead, we assume he can reasonably well guess the probability distribution of the deviations of annual production about a trend over a long period. As to the sequence of "surplus" and "deficit" years, we have assumed that they are randomly "selected" from that probability distribution. Since buffer stock storage benefits are very much affected by the sequence of deviation, any worthwhile prediction of their magnitude ought to be based on a large sample of production series. Prediction of benefits and good storage planning can only be made in a probability context.

3. Stochastic simulation with the aid of a computer has proved well-suited for the analysis of buffer stock storage plans. The models involved are simple to construct ant the storage rules easy to follow. While simulation does not yield the optimum storage rules and capacity, as a difficult-to-construct dynamic programing routine might, simulation can be used to predict how a variety of assumptions affects a number of different storage benefit indices, giving both the expected values and their standard deviations.

4. An important conclusion derived from initial empirical investigations using simulations is that many less rigorous evalutions of the problem tend to overstate the net benefits and the extent of stabilization derivable from buffer stock

* Abstracts from a larger study on cost-benefit methodology for evaluation storage investments. Messrs. N. Wilde and P. King assisted in developing and running the computer models. The views expressed are those of the author and not necessarily those of his colleagues or of the IBRD.

1) When supplies relative to demand are known to be different from one period to another, storage benefits are best analyzed by a temporal equilibrium model. (For reference, see: Evaluation on Benefits from Season-to-Season Programs, by Shlomo Reutlinger and Norman Wilde (Consultant), IBRD Economic Department Working Paper No. 66, dated February 17, 1970.)

From: Symposium on Food Grain Marketing in Asia, 1971, Asian Productivity Organization.

schemes.

THE MODEL

5. The stochastic simulation model presented in this paper consists of four parts: (a) generation of a sample of n sets of m annual, sequentially ordered production values, (b) calculation of the storage activity and related costs and benefits for each production value, (c) calculation of the discounted present value of various benefits and costs and a measure of stability for each set of m annual production values, and (d) calculation of the expected value and standard deviations of the present values and measures of stability over the sample of n sets.

6. The time-ordered production values are randomly selected from a probability distribution of production, assuming zero serial correlation.[1]

7. Storage activity is determined by the level of production and storage rules, and is constrained by available vacant storage capacity, and the amount of grain available in storage, respectively. The storage rules express the desired level of stabilization, i.e., the quantity of grain consumption not to be exceeded, Q_B, and the minimal quantity of grain consumption to be made available, Q_S.

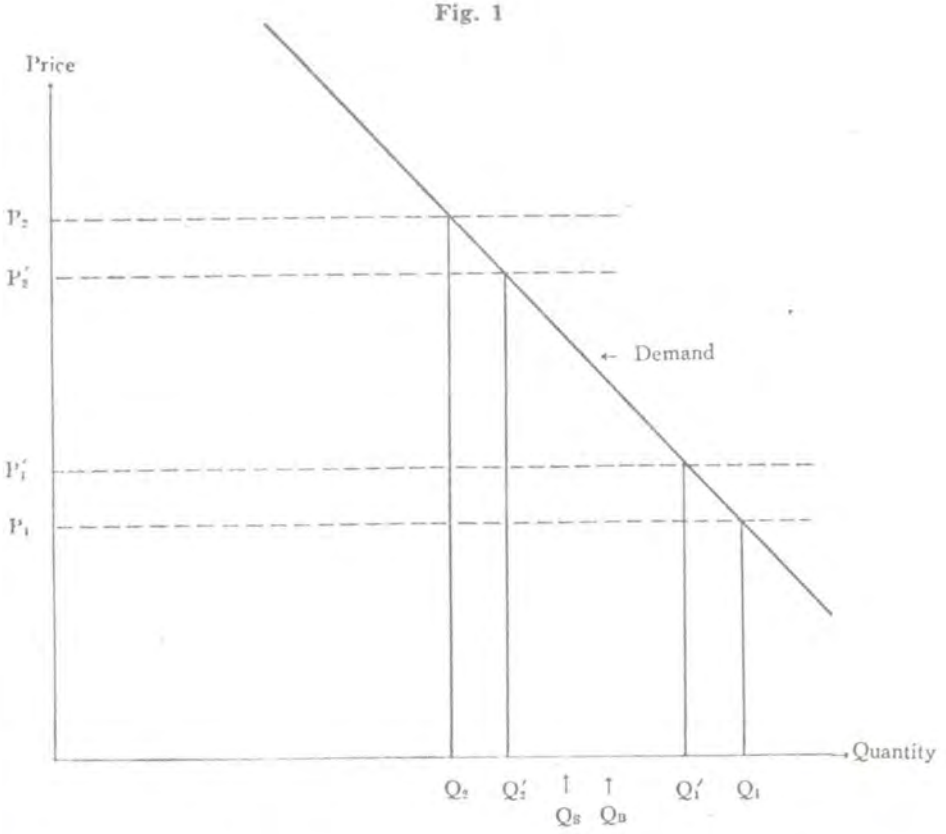
8. The *desired* level of storage is calculated as follows: if production Q is greater than Q_B, the desired amount of grain to be put into storage is $(Q-Q_B)$. If Q is between Q_B and Q_S, no storage activity is desired. If Q is less than Q_S, the desired amount of grain to be taken out of storage is (Q_S-Q). The *actual* amount of grain put into storage can, of course, never exceed the size of available storage capacity, and the actual amount of grain taken out of storage cannot exceed the amount of grain available in storage. Available storage space and the amount of grain in storage depend on the maximum available storage capacity and the storage activity in prior years. Hence, the estimates of storage activity are specific to a given sequentially ordered production series, the given storage rules and the given maximum storage capacity.

9. Several kinds of benefits and costs are calculated for a given level of storage activity. They can be best explained by reference to Figure 1. First, consider *social benefits and costs*. If production is Q_1 and $(Q_1-Q'_1)$ is put into storage, the social cost is the amount of grain stored multiplied by the average of the prices which would prevail without and with storage, i.e., $(Q_1-Q'_1)$ $(P_1+P'_1)/2$. To this "negative benefits" is added any variable storage cost incurred at the time grain is put into storage. If grain production is Q_2 and (Q'_2-Q_2) is taken out of storage, the social benefit is the amount of grain taken out of storage multiplied by the average of the prices which would prevail with and without storage activity, i.e., (Q'_2-Q_2) $(P_2+P'_2)/2$. From this is subtracted any variable cost incurred in taking grain out of storage.

10. The *financial benefits and costs* of a public storage corporation are similarly calculated, except the market prices of grain which prevail with storage—P'_1 when grain is put into storage, and P'_2 when grain is taken out of storage

1) Such a probability distribution can be surely estimated on the basis of historical production data.

Fig. 1



—are used to evaluate the quantities of grain. The cost of grain put into storage is $(Q_1-Q_2)P'_2$ and the revenue of grain taken out of storage is $(Q'_2-Q'_2)P'_2$. Variable storage costs are included as in the previous paragraph.

11. When production is Q_1 and an amount $(Q_1-Q'_1)$ of grain is put into storage, *farm income* increases by $(P'_1-P_1)Q_1$. When production is Q_2 and an amount of (Q'_2-Q_2) of grain is taken out of storage, farm income decreases by $(P_2-P'_2)Q_2$. Note that a long holding period is favorable to the storage effect on farm income as the benefit proceeds the cost, whereas for consumers, extended storage reduces the discounted value of benefits.

12. There are secondary effects to a reduction in price fluctuation which are not quantified in this mode. Grain prices may affect wages and if wages are sticky, a price rise in grain in one year may mean higher wages (more consumption and less savings) forever after. On the supply side, price fluctuations result in price uncertainty and in retrospect less than rational allocation of resources. Calculation of these beneficial effects of buffer stocks remain a challenge for further work. However, in the meantime, the simulation model has been used to estimate the effect of storage on reducing price fluctuations and farm income fluctuations as measured by their standard deviations.

13. Having calculated the social and financial costs and benefits and farm income changes as well as the price and farm income for each year in the set of m annual observations, the next step is to calculate the *present value* of

social and financial benefits and farm income changes using a desired discount rate, and the standard deviation of price and farm income based on the m observations in the set.

14. Finally, since any measure of benefits is very specific to sampling variation in the frequency distribution of production and particularly in the sequential ordering of production levels, n values of each of the above measures, derived from different, randomly chosen m-year-long production sequences, are used to derive estimates of their expected values and standard deviations based on the sample of n sets.

ILLUSTRATIVE CONDITIONAL PROJECTIONS

15. To illustrate even more concretely how the model is used, consider the following data:

(a) A triangular probability distribution of production with a mean of 40 million tons and a range from 34 to 46 million tons.

(b) A linear demand function with price elasticity of −0.5 at the mean production and mean of price ($100), i.e.,

$$P = 300 - 5Q$$

(c) Variable storage cost is $1.00 per ton at time of loading and the discount rate is 6 per cent.

(d) Maximum storage capacity is one million tons and the storage rules (Q_B, Q_S) are as follows:

$Q_B = 41$ (i.e., the intention is not to let consumption exceed 41 million tons).

$Q_B = 39$ (i.e., the intention is not to let consumption be less than 39 million tons).

16. Sample calculations of the storage activity and some benefit indices for a number of years are shown in Table 1. Clearly, the results are very specific

Table 1. Illustration of Year-to-Year Simulation of Buffer Stock Operations
(Maximum Storage Capacity: 1 million tons)

(Strage Rules: $Q_B = 41$, $Q_S = 39$)

Year	(1) Produciton (randomly selected from P.D.)	(2) Opening Stock	(3) Grain Stored	(4) Social Benefits (Million $)	(5) Price Without Storage ($)	(6) Price with Storage ($)
1	45.8	0	1.0	− 74	71	76
2	44.8	1	0	0	75	75
3	41.2	1	0	0	94	94
4	37.6	1	−1.0	109	112	107
5	37.2	0	0	0	113	113
6	43.1	0	1.0	− 88	85	90
7	38.2	1	−0.8	86	109	105
8	40.0	0.2	0	0	100	100
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
30	.	.	.	.	.	.

to the change-controlled production series. Particularly the sequential ordering will determine the total amount of grain stored (capacity utilization) and the cost of holding grain. If, for instance, five years have elapsed between time grain is put into and taken out of storage and a 6 per cent discount rate is used, the net grain would have to exceed 25 per cent for the discounted storage benefits to be positive.

17. Table 2 shows the expected values of a number of benefit indices obtained from simulating buffer stock operations when the above stated assumptions apply, but the storage rules and maximum storage capacities are varied. Each expected value in the table is obtained from a sample of 300 runs of 30 years duration. Index (2), the present value of net benefits, is obtained by subtracting $25 per ton for construction costs of the storage facilities minus their discounted salvage values after 30 years.[1] Per cent capacity utilization measures the average annual amount of grain put into storage per 100 tons of storage capacity.

18. Particularly noteworthy are the declines in marginal benefits as storage capacity increases. Beyond a point it would not pay to increase storage activity even if the facilities could be obtained without cost.

19. Also noteworthy is the large gain in farm income from the buffer stock operations.[2] This might explain why farmers' lobbies would advocate large buffer stock programs. The time dimension of storage works against the consumer; he bears the cost when grain is withdrawn from consumption and gets a benefit several years later, when grain is withdrawn from storage. The farmers' time dimension is the mirror image of the consumers': farmers benefit now and pay later.

20. Finally, it should be noted that the expected reduction in price fluctuations is not all as impressive as advocates of large buffer stock operations would have us believe. While the storage rules reflect the desire to practically eliminate the large price fluctuations as reflected in the size of the standard deviation ($12.5), the fluctuations are reduced only to $10 (24 per cent) even when the storage capacity is fairly large.

21. Table 3 shows the standard deviations of several of the calculated benefit indices. As expected, the dispersion of discounted benefits stemming from the incidence of differing sequences of production levels is quite large. This adds a dimension of risk to storage investment for buffer stock operations which is above and beyond the risk arising from the imprecise predictability of all other investment-related events.

22. Table 4 shows what storage benefits would be if the price elasticity is −0.25 rather than −0.5. The benefits are generally much larger, but even under such an extreme assumption, the optimum capacity (3 million tons) is less than the standard deviation of production (3.7 million tons). The benefit esti-

1) One finds in the literature recommendations to provide for buffer stock operations of the order of one standard deviation of production fluctuation. Our analysis suggests that a more optimal size in this specific case may be much smaller.

2) The large gains obtained in this case result directly from having assumed a linear demand function.

Table 2. Expected Indices of Storage Benefits
(Price Elasticity: -0.5)

Storage Rules (Qn, Qs)	Indices of Benefits	Storage Capacity million tons C	.5	1	2	3
			(Million Dollars)			
	(1) P. V. of Gross Eco. Bene.		10	[14]	11	− 5
	(2) P. V. of Net Eco. Ben.		[−2]	−11	−31	−80
	(3) P. V. of Gross Fin. Ben.		7	3	−23	−60
	(4) P. V. of Net Fin. Ben.		[−5]	−22	−27	−135
40.5, 39.5	(5) P. V. of △ Farm Inc.		85	166	315	444
	(6) (4) + (5)		80	144	288	309
	(7) Standard Deviation of price ($)	12.5	4.6	10.9	9.7	9.0
	(8) Standard Deviation of Farm Income	260	228	206	186	186
	(9) Percent Capacity Utilization		20	19	16	14
	(1) P. V. of Gross Eco. Ben.		9	[14]	9	− 7
	(2) P. V. of Net Eco. Ben.		[−3]	−11	−41	−82
	(3) P. V. of Gross Fin. Ben.		7	5	−18	−50
	(4) P. V. of Net Fin. Ben.		[−5]	−20	−68	−125
41, 39	(5) P. V. of △ Farm Income		81	157	294	413
	(6) (4) + (5)		76	137	226	288
	(7) Standard Deviation of price ($)	12.5	11.7	11.0	10.0	9.3
	(8) Standard Deviation of Farm Income	260	229	206	185	178
	(9) Percent Capacity Utilization		16	15	13	11
	(1) P. V. of Gross Eco. Ben.		5	[−6]	− 4	−20
	(2) P. V. of Net Eco. Ben.		[−7]	−19	−54	−90
	(3) P. V. of Gross Fin. Ben.		4	0	−19	−43
	(4) P. V. of Net Fin. Ben.		[−8]	−25	−69	−118
42, 38	(5) P. V. of △ Farm Income		69	133	247	346
	(6) (4) + (5)		61	108	178	228
	(7) Standard Deviation of Price ($)	12.5	11.9	11.3	10.6	10.1
	(8) Standard Deviation of Farm Income	260	235	217	195	183
	(9) Percent Capacity Utilization		10	10	8	7

Table 3. Standard Deviations of Indices of Storage Benefits
(Price Elasticity: -0.5)

Storage Rules (Qn, Qs)	Index of Benefits	Storage Capacity million tons .5	1	2	3
		(Million Dollars)			
	(1) P. V. of Eco. Ben.	9	17	28	37
40.5, 39.5	(2) P. V. of Fin. Ben.	9	16	26	35
	(3) P. V. of △ Farm Income	17	35	70	106
	(1) P. V. of Eco. Ben.	9	15	28	37
41, 39	(2) P. V. of Fin. Ben.	9	14	25	35
	(3) P. V. of △ Farm Income	18	37	74	113
	(1) P. V. of Eco. Ben.	9	17	27	37
42, 38	(2) P. V. of Fin. Ben.	9	15	25	38
	(3) P. V. of △ Farm Income	21	41	84	127

Table 4. Expected Values of Indices of Storage Benefits
(Price Elasticity: –0.25)

Storage Rules (Q_B, Q_S)	Index of Benefits	Storage Capacity (Million tons)					
		5	0.	1	2	3	4
				(Millon Dollars)			
	(1) P.V. of Gross Eco. Ben.		42	71	102	[107]	97
	(2) P.V. of Net Eco. Ben.		30	46	[52]	32	− 3
	(3) P.V. of Gross Fin. Ben.		35	48	35	− 4	−51
	(4) P.V. ef Net Fin. Ben.		23	[23]	−15	−79	−151
40.5, 39.5	(5) P.V. of $\triangle$ Farm Income		170	332	629	888	1,121
	(6) (4) + (5)		193	355	614	809	970
	(7) St. Dev. Price ($)	24.8	23.0	21.4	19.0	17.4	16.3
	(8) St. Dev. Farm Income	749	677	620	537	589	461
	(9) Cap. Utili. (%)		20	19	16	14	12

mates are too high if one considers it unrealistic that a country would isolate itself from trade at any price rather than experience further price fluctuations. In the case used for illustration it was implied, for instance, that the value of storing a ton of grain from a time when production is one standard deviation above normal to a time when production is one standard deviation less than normal is approximately $50. With trade being a realistic alternative to storing, the value of storing would never exceed the difference between the export and import price.

EVALUATION OF MODEL

23. A major shortcoming of the simulation model is that it does not yield optimal storage rules, which could be obtained by using dynamic programming. The offsetting advantage is that the storage rules are simple and more likely to be followed in practice. Furthermore, given the low computing cost, it is feasible to experiment with different storage rules until optimal rules are approached. For instance, we could let the amount of desired storage be proportional to the level of production and the amount of grain instorage, with the proportionality coefficients to be determined by experimentation.

24. The great advantage of the simulation approach is the ease with which it is possible to calculate the effect of different storage capacities and rules on a large number of measures of benefits. For instance, the measured social benefits do not necessary account for the difficult-to-measure indirect effects of a reduction in price fluctuations. It is useful to see, therefore, the trade-off between measurable benefits and the standard deviation of prices as storage capacity increases.

25. Another advantage of the simulation over the analytical optimization approach is the ease with which it is possible to calculate not only expected values but also measures of dispersion of the benefit indices. Intuitively, the benefits will be quite different in the case where an investment in storage is followed by seven "bad" years and then by seven "good" years, from the case where the "good" and "bad" years alternate over the life of the investment. One would like to have, therefore, a measure of this kind of risk attached to a storage

investment.

26. The model implies that storage operations from "good" to "bad" production years are the only alternative to fluctuating consumption. This is clearly untenable when production fluctuations are large, the price elasticity is low, and a country enjoys proximity to export and import markets. When trade is feasible and advantageous, storage benefits will usually be less than those measured by assuming the only alternative is to let domestic consumption vary with domestic production.

27. The social benefit does not include a measure of the benefits from shifts in the supply and demand functions which may result from operating a price stabilization scheme. This is clearly a shortcoming, but not so much of the model as of empirical knowledge about the magnitude of such shifts. We hope that the measure of stabilization calculated will be, nevertheless, an additional useful indicator of the benefits of a storage program of a given size. As our illustrations have shown, there is a large difference between the intended and achievable extent of stabilization with a given storage capacity.

28. Many extensions or variants of the simulation model discussed are possible. We have already experimented with introducing a growth tend into annual supply and demand and supplementing the standard deviation of price by indices of dispersion which would give larger weights to extreme deviations, as a measure of how much storage might eliminate undesirable effects of supply fluctuations. We have also proposed a model which measures the benefits of buffer stock storage when the function of such storage is to eliminate fluctuations in import requirements. Finally, we are prepared to invest effort in exploring whether more complex storage rules could substantially increase the expected storage benefits, and we generally need to further test the sensitivity of such models.

OP-RESEARCH
(RAISING THE PRODUCTIVITY OF SMALL FARMS)

Those listed below

October 3, 1974

D. C. Rao, VPD

Panel Review of Research Proposals

A panel consisting of Messrs. Balassa (Chairman), Basil Kavalsky, Roger Norton, Shamsher Singh and Jean Waelbroeck will review the following research proposals on Friday, October 11 at 10:00 a.m. in Room N-236. Messrs. C. Bruce, A. Egbert and S. Reutlinger will attend.

Title	Proposers
Raising the Productivity of Small Farms	Bruce/Egbert
Simulation of Buffer Stocks	Reutlinger

Copies of the research proposals are attached.

The recommendations of the panel should be sent to me by October 15.

Attachments

Distribution

Messrs. Balassa, Kavalsky, Norton, Singh, Waelbroeck, Bruce, Egbert, Reutlinger

cc: Messrs. B. King, Yudelman, Gulhati, Mrs. Hazzah

DCRao:gm

WORLD BANK RESEARCH PROGRAM

Project Proposal

Date of Submission: October 2, 1974

SECTION A

PART I. PROJECT IDENTIFICATION

1. Title:

~~FAO/IBRD Cooperative Research Project:~~ "Raising the Productivity of Small Farms"

2. Department Responsible:	3. Staff Member Responsible:
Agriculture & Rural Dev.	Mr. A. Egbert
4. Total Cost (U.S. $): 30,000 (First phase of Part II only)	5. Total Staff Time (manmonths) Professional: 1 Special Services: -

PART II. COORDINATION AND APPROVAL

1. Interdepartmental Coordination:

	Department	Name & Signature	Support Project	Do not Support Project-Comments Submitted
a.	Development Research Center	Mr. J. Duloy		
b.	Employment & Rural Dev. Division	Mr. M. Leiserson		
c.				
d.				

2. Approval:

Division Chief
Colin Bruce

Department Director
Montague Yudelman

NOTE: Please consult instructions issued August 1973 for completion of this Form and preparation of project narrative.

Do not fill

Date received:

Review Panel:

PART III. IMPLEMENTATION

1. Date Work to Start: Part I in progress 2. Date First Draft Expected:
First Phase of Part II: October 31, 1974

3. Final Report Due:
June 30, 1975

4. Implementation Method: Names:

a. Bank Staff	/xx/	Mr. A. Egbert
b. Individual Consultants	/xx/	FAO
c. LDC Contractor/Institute	/ /	
d. Developed Country Contractor/Institute	/ /	
e. Seminar	/ /	

5. Reports Expected in the First Year:

Quarterly Progress Reports

Final Report on Part I and first phase of Part II expected by June 30, 1975.

PART IV. FINANCIAL AND STAFF DATA

1. Dollar Costs (Estimated Disbursements by Fiscal Year):

	FY75	FY76	FY	After FY	Total
a. Contractual)	22,450				
b. Travel)					
c. Data Processing	7,550				
Total	30,000	60,000			

2. Staff Requirements (manmonths):

	FY75	FY	FY	FY	Total
a. Professional	11.0				
b. Special Services	Various				
Total					

FAO/IBRD Cooperative Research Project

"Raising the Productivity of Small Farms"

Outline of a Research Framework

1. Arising out of the Nairobi Speech, the World Bank is keenly interested in obtaining a better understanding of the requirements for raising the productivity of small farms. The number of determinants of productivity are large 1/ and vary from country to country and from one agro-ecological zone to another within countries.

2. A three-pronged approach has been adopted. First, attempts are being made within the CPS-DPS complex to devise a number of econometric models 2/ which will hopefully provide some answers, but the data base is very poor and it is not possible to build into these model constraints arising from such things as political, organizational and procedural factors which might be subsumed under the heading "absorptive capacity constraints." Such lack of realism in all these models limits their operational usefulness, although something interesting may be learnt about some interrelationships within the agricultural sector.

3. Second, a study is under way to find out what the main constraints are in increasing output of food grains in Asia (with particular emphasis on rice and wheat and with special reference to small farmers), and what needs to be done to increase productivity. Phase I of this joint Agriculture and Rural Development, CPS/South Asia/East Asia and Pacific project

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1/ See attached list of parameters. (Appendix A)

2/ Mr. Raj Krishna is working on a general programming model and Mr. A. Egbert is devising an input-output model of the Ghana Agricultural Sector to identify the main data gaps and to assess the practical usefulness of such models.

is under way, being funded by the Research Committee.

4. The third prong of the approach, and one which is really basic to the other two, is an empirical research project designed to obtain a comprehensive profile of the rural poor which we do not have at the moment. Thus, it is more fact-finding and descriptive than analytical, at least in its first phase, but it should not be under valued for this reason. Part I now under way is being carried out by a number of FAO departments, coordinated by an Inter-Departmental Working Group under the Chairmanship of Mr. Kenneth Bachman, Director of the Statistical Division. The total cost to the Bank of Part I is $70,000 which is being met as to $50,000 by IDA from other sources and $30,000 from Departmental funds.

5. Part I, which essentially involves speeding up the processing and analysis of the 1970 World Census of Agriculture returns, will provide the following descriptive material for about 17 countries--the number for which adequate returns appear to be available:

(i) main characteristics of small farms covering (a) the number, size, tenure, resources used (land, people, livestock, agricultural machinery, etc.); (b) output of crop and livestock products (per capita, per hectare and per holding) in terms of calorie equivalents or possibly value of gross output, with indications of variability due to irrigation, where possible; (c) employment; (d) location by climatic zones, agricultural regions, etc.; (e) use of technology, kinds of prevailing agricultural practices, etc.; (f) possible effects of weather variability on annual agricultural production; and (g) socio-economic characteristics of people on small farms;

(ii) the relative importance of crops on small farms in relation to total agriculture, with subdivision of the small farms into the following area size classes: under 1 ha, 1-2 ha, 2-5 ha, 5-10 ha, 10-20 ha and 20 ha. and above;

(iii) trends in the numbers of small farms wherever the required information prior to the 1970 census is available (e.g. from the 1960 census).

6. It should be noted that the FAO World Census of Agriculture does not yield farmgate price and cost data so as to be able to calculate gross and net value of output, which is one of the parameters we are most interested in because we would like to obtain distributions of small farms by size of net income; area size is an unsatisfactory measure for many reasons. Taking into account the availability of other data, FAO estimate that they could obtain very rough gross output figures for small farms, but in most cases the price data are averages for agriculture generally and do not refer to small farms. As a cross check, we agreed with FAO to carry out an analysis of calorie equivalents, adjusted for protein values. This does not get round the price problem entirely because the calorie equivalents of non-food items have to be converted into calorie equivalents via market values. There are also other difficulties, but this method has some interest for us in connection with the estimation of the "critical level of consumption" in social cost-benefit analysis. As far as the Small Farms study is concerned it can never be more than an imperfect proxy for net income or at least gross value of output.

7. Part II of the Study consists of two components. For Part A, it is proposed to take 3 of the 17 countries studied in Part I, where the data

base is somewhat better than average, and carry out an analysis in greater depth, combining the Census data with agro-ecological and farm management information obtained by other means. Based on the data obtained in Parts I and IIA, Part IIB would consist of an assessment of the feasibility of devising and implementing a minimum information system in LDCs necessary for formulating rural development strategies and programs.

8. The countries originally proposed for Part IIA were Tanzania, Mexico and the Philippines--all Bank countries of concentration, but FAO have since informed us that the Philippines would present difficulties with respect to data availability and suggest replacing it by Pakistan. In Tanzania, there is a relatively good data base as regards agrometeorology, and soils and a nationwide household budget survey of mainland Tanzania was undertaken in 1969. Earlier in 1967 and 1968, two small food consumption surveys were made, but farm management data is limited. Thus, although some information is available, Tanzania is not an ideal country because additional farm management data would have to be obtained in a sample survey. An alternative possibility is one or two states in India, but, if Pakistan is selected in place of the Philippines, it would be preferable to have an African country. Although it might be somewhat more costly because of the additional sample survey work required, it is recommended that Tanzania be retained, both because it is one of our countries of concentration and because we need to have some knowledge of African conditions. Moreover, Tanzania is a country whose government is deeply committed to rural development.

9. The in-depth study proposed in Part II would make a determined effort to convert physical inputs and outputs into value figures and thus obtain gross output and net income and hence a farm size distribution by either or both these categories. The value categories will then be broken

down by main crops, agro-ecological zones, the nature and extent of inputs and by socio-economic characteristics.

10. The detailed FAO proposals for Part II of the Small Farms Study, leaving out the proposed classification of farmers and their families by categories according to consumption levels are given in Appendix B. They are specified in terms of one country only--Tanzania. With suitable modifications in the light of the Tanzanian experience it can and will be generalized for the other countries in Part II of the Study. It is for the Tanzanian part that $30,000 is being requested for FY75. The rest of the Part II study would not commence until the beginning of FY76.

11. The FAO inputs for initial work on Part II are as follows:

(a) Part I of the project will provide data for Tanzania by appropriate administrative and agroeconomic zones used in the sample agricultural census. These data will be grouped to correspond to the agroecological zones for Tanzania to be described under objective 1.2 in the Appendix.

(b) By reorganizing the Regular Programme work priorities in the participating technical units of FAO, it should be possible to devote the equivalent of 12 man-months of professional staff time; an equivalent amount of secretarial staff time; office supplies and related services. Professional inputs from as many specialist officers and programme supervisors as required will also be provided.

(c) The above described input by FAO is not sufficient to undertake all the initial work required for Part IIA of the project in Tanzania, and therefore the following funds are requested by FAO to complete Part IIA of the Research project, and this request is supported by us.

12. The estimated cost breakdown of the first phase of Part IIA of the research project is as follows:1/

		$
(a)	Consultant for the preparation of agroecological zones map for 6 weeks;	3,750
(b)	Consultant for the interpretation of soil map and integration of the data with the ecological map - for 2 months	5,000
(c)	Consultant/Agronomist to assess the agricultural potentialities of the various agroecological zones delineated according to the physical resources within the country - for 1 month	2,500
(d)	Drafting of maps - 1 month	1,000
(e)	ERTS - 1 imagery	200
(f)	Farm Management Consultant to assist with sampling, training of staff for data collection and processing/ analysis of data - for 4 months (a sizeable proportion of this amount may have to be used in Tanzania to pay travel, per diem and honorarium to local staff for data collection)	10,000
(g)	Additional staff for putting data on punch cards for computer	1,500
(h)	Additional computer costs for data analysis (farm management and household budget surveys)	5,000
(i)	Contingencies	1,050
	Total	30,000

13. Further Work on Part II. FAO estimate that they will complete the work on Tanzania for Part II by the end of July 1975. A proposed outline for the main sections of the final report is as follows:

1/ As estimated by FAO.

"(i) Definition of agroecological zones and regional production potentials based on physical conditions;

(ii) socio-economic conditions of each zone (including output, employment, nutrition, farm size, land tenure, etc.);

(iii) survey of farm management practices and farm employment situation, estimates of net farm output and nutrition in each zone including small and improved farms;

(iv) small farm potential for development and production (diversification, yield increase, etc.);

(v) provisional definition of target group;

(vi) institutional and policy socio-economic constraints affecting the development of small farms."

14. FAO's proposed "Outline of Actions" is given in the Appendix B.

15. Provisional Method of Analysis. The following is FAO's proposal:

"The study is to cover farms and farming systems in all the main agroecological zones of Tanzania, in each of which 2, 3, 4 ... standard or representative systems will be identified and quantified in detail. Standard plans can be formulated for each of these systems using either linear programming or monte-carlo simulation. The choice between these methods in each situation will depend primarily on the degree of system stability: linear programming will be used, generally, in low-risk, high-rainfall areas, and/or where the pattern of farming is stable. Simulation will be used where year-to-year yield and/or commodity price variability is high, e.g. in marginal rainfall areas or where the farming system depends primarily on a single commodity the price of which is a critical determinant in the long-run economic viability of the system, e.g. cotton. In this case, both computerized techniques are justified not primarily on grounds of the complexity of the problem, but the large volume of data to be handled. Once the general nature or configurations of each system have been identified, it will be possible to prepare a file of linear programming and simulation models to which the

data for each system - i.e. the parameters - can be applied. This will permit two things: planning or evaluation of existing and proposed farm systems at the micro farm/family level, and evaluation of the consequences of alternative Government policies before these are actually adopted."

16. The above outline and quotations from the FAO report refer essentially to Part IIA--the in-depth case studies in three countries. Part IIB--the study of the feasibility of devising and implementing a minimum information system for formulating rural development strategies and programs--has not yet been discussed with FAO. It has arisen as a result of internal discussions within the Bank to give the overall study a more operationally useful focus. Work on it would not start until some time in FY76 and would probably not be undertaken, or at least undertaken in the form currently envisaged, if the results of the first in-depth case studies indicate that it would not be worthwhile continuing with the other two proposed case studies.

17. Research Committee Financing. It will be noted that the total cost of the Tanzanian phase of Part IIA of the study, to be completed in FY75, is estimated at $30,000. It does not follow that the cost of similar studies in, say, Mexico and Pakistan will be $60,000. FAO have not yet estimated the costs in these countries, but two factors are relevant: first the Tanzanian experience should result in some overhead economies for the rest of the study; and second, the additional field work required from Tanzania--admittedly the most difficult of the three countries--may not have to be repeated in the other countries.

18. In agreeing to finance the first phase of Part IIA of the study, the Bank would not necessarily be committed to financing the rest of the study. Nevertheless, unless the Tanzanian study turned out be a failure,

there would be a presumption that we would finance the rest of Part II. It is provisionally estimated that if only 2 more countries were studied in depth, the additional cost in FY76 at constant prices of Part IIA would be about $60,000. Work on Part IIB is provisionally estimated to cost about $12,000.

19. Based on FAO's submission, quoted above and in Appendix B, Messrs. Egbert and Raj Krishna had some discussions with Mr. Kenneth Bachman on the "Objectives", "Planned Program of Work" and "Method of Analysis". With regard to the latter, a decision must be taken on the use of programming and simulation after a further review of the data base.

POTENTIAL FOR INCREASING GRAIN PRODUCTION IN ASIA, PARTICULARLY RICE AND WHEAT

Range of Variables - Areas of Possible Investigation

A. Land and Water

1. Larger area under crops

2. Irrigation
   (a) New or extended irrigation systems
      (i) Run-of-the-River
      (ii) Storage
      (iii) Groundwater - wells and pumps
   (b) Renovation of poor existing systems
   (c) Increased intensity of on-farm development leading to improved crop intensities

3. Land Reform

B. Production Technology

1. Fertilizer Use
   (a) Optimum quantities
   (b) Larger acreage

2. Crop Protection - Insecticides, Herbicides, Fungicides

3. High-Yielding Varieties (HYV)

4. Mechanization
   (a) Seed-bed preparation
   (b) Weeding
   (c) Harvesting and threshing

5. Non-Capital Intensive Technologies
   (a) Spacing and Timing of planting
   (b) Weed control
   (c) Pest control
   (d) Improved threshing

C. Storage and Marketing

1. Improved storage
   (a) On-farm
   (b) Off-farm

2. Marketing
   (a) Improved knowledge about market trends and prices
   (b) Improved and more local and regional markets
   (c) Marketing Boards
   (d) Processing

3. Transport
   (a) Farm-to-market roads
   (b) Other transport and port facilities

D. Economics

1. Improved Factor Price Relationships
   (a) Terms of Trade for agriculture
   (b) Ratio of output/input prices, particularly ratio of fertilizers and HYV prices to output prices

2. Reduction of Risk
   (a) Minimum support prices
   (b) Buffer stocks

3. Taxes and Subsidies
   (a) Reduction or elimination of tariffs and other taxes which discriminate against agriculture, e.g., export taxes on crops
   (b) Reduction or elimination of direct and indirect subsidies, such as Aids to Industry legislation, which favor manufacturing industry.

E. Institutional Factors

1. Improved Credit

2. Better Research

3. Better Education and Training

FAO PROPOSALS

1.0 "Objectives of Part II Study for Tanzania

- Agroecological Aspects:

1.1 The available climatological data will be analyzed and a map and tables prepared showing various climatic zones expressed in terms of lengths of the growing season based on water availability and including the constraints due to temperature during the growing season.

1.2 The map so prepared will be matched against the map for soils relief, vegetation, geology, geomorphology, hydrology, with the view of preparing a map of the agroecological zones. On the basis of present soils and climatic maps, it is estimated that there would be six agroecological zones.

1.3 From existing land use and cropping patterns in the country an index of the agricultural potential based on the physical environment will be established and expressed in terms of crop production capacity per ha. per year. This index will be calculated for each agroecological zone and main crop.

- Farm Management Aspects:

1.4 A sample of farms will be selected within each of the agroecological zones identified under 1.2 above, and complete farm resource use and input/output data collected. The sample would be a subsample of the farms covered by the agricultural sample census, and hence it would be stratified according to the size of holding classification used in Part I of this Project. Con-

"sideration will be given to possible further stratification of the farms according to the major type of farming groups within each zone, i.e. livestock farms; mixed farming - crops and livestock; and various crop combinations.

1.5 Data on crops and livestock will be collected from various research stations, field trials and from progressive farmers within each agroecological zone which will later be used as coefficients for estimating the type and amount of inputs required and the potential increase in productivity by size and type of farm from the use of improved practices and additional inputs.

1.6 The data and information to be collected will first be analyzed to identify the constraints to improved production within each sample group including - to the extent possible - those related to the goals of the various farmer groups, such as greater desire for maximum leisure than for increased production, number of cattle rather than improved output of saleable products, etc.

1.7 Various comparisons and analyses will be completed, such as: quantifying labour requirements by enterprise (i.e. technical unit, e.g. livestock or crop) according to power source and equipment used (hand labour, animal or power drawn); probable effect on production, labour utilization and income if various improved practices and additional inputs including varying levels of mechanization were used; comparison of possible land labour, savings, capital efficiency at the farm level, and creation of exportable commodity surplus at the regional, social or national level between various individual farm groups with that of large scale Ujamaa Village type farming ventures (assuming equal level of management ability and farmer initiative for both levels).

2.0 "- Planned Program of Work:

2.1 Objectives 1.1, 1.2 and 1.3 are expected to be completed by 31 December 1974.

2.2 Achievement of objectives 1.4 through 1.7 will need to be closely coordinated with, and partially achieved in cooperation with, present on-going UNDP/FAO and other activities in Tanzania. The UNDP Regional Planning Team has already stated that "a farm management approach will be required as the essential basis for the design of sound micro-economic solutions in this area", and has correspondingly given strong emphasis to this speciality in the team's proposed composition. The Farm Management Specialist to be appointed in the UNDP/FAO Tanzania Rural Development Bank Project, and his counterparts will also assist in this project. The University of Dar-es-Salaam has also agreed to work closely with the Tanzania Rural Development Bank and FAO to complete the required farm management studies.

2.3 Standard forms to be used for collection of field data will be finalized by mid-September 1974. A farm management data storage and retrieval system will also be finalized by the same date, which will be later used to store and process the data into various types of tables for analytical purposes. Standard forms will be distributed in September 1974 for the collection of field data by the farm management specialists and their staff.

2.4 The steps envisaged to be used for data collected and provisional methods for analysis are explained in "Outline of Actions" below.

3.0 "Outline of Actions

3.1 Identify, from existing maps, the six agroecologizal zones of Tanzania and the major types of farming within each area.

3.2 In cooperation with the staff who have completed the Agricultural Census, review the number and characteristics of farms (based on available original data) within each size group in each agroecologizal zone and decide upon the size of sample it is feasible to select in each size group based on the availability of participating staff for data collection and the time available (tentative deadline for data collection: end April 1975).

3.3 A training session will be held for all participating staff to explain the correct use of the data collection forms and data collection techniques to be used.

3.4 Data for the standard forms supplied by FAO will be recorded to the extent possible, from the original Census data. Field visits to sample farms will be made to collect, through on-farm interviews, any missing data or information.

3.5 A tabulation of cost/price data for past years determine seasonal and annual variations and trends, along with annual yield fluctuations will need to be completed. Considerable work has been done on this subject for some commodities; however, it is likely that additional information will be required.

3.6 Data processing and analysis will be completed at FAO Headquarters with the assistance of the leading [illegible] management

expertise from Tanzania. (Deadline for completion of farm management portion of Project: July 1975.)"

OP-RESEARCH
(DETERMINANTS OF SCHOOLING IN N.E. BRAZIL)

Those listed below

October 3, 1974

D. C. Rao, VPD

Panel Review of Research Proposals

1. A panel consisting of Messrs. Schulmann (Chairman), John Holsen, Timothy King, and Andreas Tsantis will review the following research proposal on Wednesday, October 9 at 3:00 p.m. in Room E-624. Mr. Jallade will attend.

Title	Proposer
The Determinants of Schooling in Northeast Brazil	J-P. Jallade

2. Copies of the proposal from Mr. Jallade and the background document from ECIEL are attached.

3. The recommendations of the panel should be sent to me by October 14.

Attachments

Distribution:

Messrs. Schulmann, Holsen, T. King, A. Tsantis, Jallade

cc: Messrs. B. King, Ballantine, Mrs. Hazzah

DCRao:gm

WORLD BANK RESEARCH PROGRAM

Project Proposal

Date of Submission: September 25, 1974

SECTION A

PART I. PROJECT IDENTIFICATION

1. Title: The Determinants of Schooling in Northeast Brazil

2. Department Responsible:	3. Staff Member Responsible:
Education (CPS)	Jean-Pierre Jallade
4. Total Cost (U.S. $):	5. Total Staff Time (manmonths)
US$96,000	Professional: 2 Special Services: None

PART II. COORDINATION AND APPROVAL

1. Interdepartmental Coordination:

	Department	Name & Signature	Support Project	Do not Support Project-Comment Submitted
a.	Latin Amer. & Car. Education Division	K.M Thint	X	
b.	DPS/DRC	John H. Duloy	X	
c.	Development Eco. Dept. Pop. & Human Res. Dev.	Timothy King	[illegible]	[illegible]
d.				

2. Approval:

Division Chief

Department Director

NOTE: Please consult instructions issued August 1973 for completion of this Form and preparation of project narrative.

Do not fill

Date received:

Review Panel:

PART III. IMPLEMENTATION

1. Date Work to Start: January 1975 2. Date First Draft Expected: December 19

3. Final Report Due: June 1977

4. Implementation Method: Names:

a. Bank Staff . . . . . /X/ Jean-Pierre Jallade

b. Individual Consultants . . . . . / /

c. LDC Contractor/Institute . . . . . /X/ ECIEL

d. Developed Country Contractor/Institute / /

e. Seminar. . . . . / /

5. Reports Expected in the First Year:

NONE

PART IV. FINANCIAL AND STAFF DATA

1. Dollar Costs (Estimated Disbursements by Fiscal Year):

	FY 75	FY 76	FY 77	After FY	Total
a. Contractual	32,000	32,000	32,000		96,000
b. Travel					
c. Data Processing					
Total	32,000	32,000	32,000		96,000

2. Staff Requirements (manmonths):

	FY 76	FY 77	FY	FY	Total
a. Professional	1	1			2
b. Special Services					
Total	1	1			2

SECTION B: PROJECT DESCRIPTION

1. GENERAL OBJECTIVES AND STRATEGY

The present research proposal is expected to highlight the future expansion of the educational system in the backward areas of Brazil. It is recalled that the lending programme for education in Brazil amounts to about US$114 million during FY 75-78,[1/] a significant proportion of which will be spent in the North and North-East of Brazil.

The process of educational growth, including both demand and supply will be analyzed in a detailed way, thus providing useful insights to planners in this area. The study will focus on the determinants of schooling as they result from supply factors originating in the country's overall education and employment policies and from demand factors originating in the household. More specifically, the study will address itself to the following question: what determines the amount of schooling obtained by an individual (with secondary emphasis on the type of schooling)?

This question has direct policy implications in this area of Brazil where enrolment ratios lag far behind those of Southern Brazil. The official policy aims at raising those enrolment ratios to levels comparable to those of richer states but the optimum mix of policies which will achieve this objective has still to be designed. Should such policies emphasize:

(i) location of schools at the expense of subsidization of education?

(ii) family income at the expense of prices of basic foodstuffs?

(iii) the release of school-age children from employment at the expense of changes in school entry requirements?

(iv) better teachers at the expense of better educated parents?

1/ Total project costs would amount to US$250 million.

All these questions, among others, deserve to be taken into consideration by educational planners when formulating their policies. It is obvious that the remedy to educational backwardness does not lie entirely in the educational sphere. In this connection, a side-result of the proposed study would also be to spell out clearly the respective responsibilities of the numerous policy-making bodies connected with this area.

II. TECHNICAL ASPECTS

It was mentioned above that the amount and type of schooling received by an individual can be regarded as determined by two sets of considerations, namely, those originating within the household and outside it. To a large extent, household characteristics coincide with demand considerations, while out-of-household factors coincide with the supply of schooling. Both sets of factors will be considered in the study.

The amount of schooling received by an individual will be measured by two different variables, namely, (i) the number of years of schooling and (ii) the amount of money actually spent by the student or by his family to obtain it.

1. Years of Schooling Received

In the first place, the study intends to explain the number of years of schooling for a group of people facing the same conditions of supply: physical availability of schools, quality and price of schooling. The analysis will include the following variables: sex of the individual, income of the household, number of members, number of children of school-age, education and occupation of the parents...etc...

Out-of-household factors will enter the analysis whenever observations are drawn from different places or times or can be adequately grouped with the groups distinguished by different supply and labour market conditions. Such external factors will include overall employment and economic conditions (example: seasonality), the physical availability of school and teachers, the

extent to which education is subsidized, the structure of the educational system: existence of entry requirements, single-grade teaching, etc.

2. Expenditure on Education

Because educational expenditure and schooling received are strongly associated, many of the variables determining the latter can be expected also to influence the former. Nonetheless, it is important to distinguish the two questions in order to assess the extent to which the costs of education affect the decision to remain in school or to leave.

The study will seek to explain expenditure per child - if possible adjusted for age and school level - mostly with household budget variables. This analysis will yield estimates of the income and price elasticities of spending on education and also of cross-price elasticities. For instance, it may be that, for low-income families, the price of food is an important determinant of educational expenditure.

III. DATA INFORMATION

Household data will provide the main basis for the present analysis. The study will draw on existing surveys such as those carried out by ECIEL, IBGE and SUDENE:

(i) In the Northeast, the household income and expenditures survey carried out by ECIEL covers the city of Recife. The survey was taken in 1968-69. It covers the full year thanks to four quarterly surveys. Between 700 and 800 households were interviewed. The sample was stratified according to a double criteria including family size and tax value of dwellings. In addition to the information on incomes and households characteristics usually raised by this kind of survey, education expenditure data are more detailed than elsewhere. They include five or six categories of ..nding -

tuition, transportation, boarding fees, books, uniforms, ...etc....

The collection of information is completed. The data cleaning phase will be over by the end of 1974 and the processing could start during the first month of 1975.

(ii) IBGE (Instituto Brasileiro de Estatistica) is presently involved in a series of on-going household surveys designed to cover the whole country or, at least, up to very small human settlements. These surveys are based on samples derived from the 1970 Population Census. They include information on employment, nutrition, household expenditures and incomes. The ECIEL coordination in Rio works in close contact with the Getulio Vargas Foundation which is currently providing technical assistance to IBGE for this project. The data are the property of IBGE but, according to past experience with this institution, they could be obtained for a reasonable fee covering programming and computing time.

(iii) In rural areas, SUDENE (Superintendencia do Desenvolvimento do Nordeste) is presently carrying out a survey of about 2,000 households in cooperation with the Population and Human Resources Division of the World Bank.[1/] The survey is expected to yield data on fertility, labor supply and education. A pilot survey of 200 households took place in April-May 1974 and the results will be available before the end of this calendar year. A much larger and more detailed survey is

1/ See RPO 299 "Economic Aspects of Household Fertility Behavior and Labour Supply in Northeast Brazil".

planned during 1975. It is envisaged that some 2,000 households located in six geo-economic areas of Northeast Brazil will be interviewed. Consultants from various Brazilian institutions and from Stanford University, and staff members from the Population and Human Resources Division are providing technical assistance to SUDENE for this project. The final version of the questionnaire is not yet completed and steps are being taken to include information relevant to the present study.

In addition to these three sources of data, detailed information about the school system will be collected from the state education agencies whenever necessary for the analysis. The approach selected for the present study is an empirical one using the simple and multiple regression model as the main tool of analysis. The study will focus on the eight or nine years of basic education, i.e., primary plus lower secondary education.

IV. ORGANIZATIONAL ASPECTS

The study will be commissioned to ECIEL,[1/] a private international organization based in Rio which comprises about 25 Research Institutes located throughout Latin America. The study will be carried out as part of the ECIEL programme on "Education in Latin American Economic Development" by a research institute designated by ECIEL.

The ECIEL Research Programme on "Education in Latin American Economic Development

In January 1975, ECIEL will launch a research programme on education and development in Latin America. The detailed content and structure of the program have been described elsewhere in detail.[2/] For the purpose of the

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1/ This is the acronym for "Estudios Conjuntos sobre Integracion Economica Latino-americana". The new address of ECIEL in Rio is Caixa Postal 740, 0 Praia Botafogo 242; Rio-de-Janeiro, GB, Brazil. Tel. 266-6103; cable address: PROGRECTEL.

2/ See "A Proposal for Research on Education in Latin American Economic Development", ECIEL, May 10, 1974.

present study, it is recalled that the ECIEL programme consists of two distinct sets of studies:

- The joint studies, which will be carried out comparatively in as many Latin American countries as possible, are designed to tackle two different issues, namely, (i) the determinants of schooling and (ii) costs and financing of education. The time horizon for these studies is two years between inception and a first draft of the results plus one year for the preparation of the final draft and publication. The present study submitted to the Research Committee for approval and financing would be a part of the joint studies.
- The pilot studies focus on the relationship between education and (distribution of) income. There will be three pilot studies, one in each of the following sectors - modern, urban "traditional" and rural. In the urban sector, the pilot study will be concerned with such questions as the interaction of education with ability and other personal or social parameters to determine job selection, mobility and income. In both the urban traditional and the rural sector, the studies will emphasize the relationships between education, migration and workers productivity. The pilot studies are expected to last four years, the first two being devoted to data gathering through ad hoc surveys.

The total costs of this research program amount to close to US$ 3 million. About 70 percent of this amount will be channelled to the various research ECIEL member institutes. The remaining will be used to support the ECIEL coordination in Rio, to finance the twice-yearly seminars gathering all member institutes and outside technical help. As about half of the total

costs of the programme originates in ECIEL's own funds and in local sources - that is, local contributions from governments,-ECIEL has been engaged in a fund-raising campaign, the expected results of which can be depicted as follows:

Sources of Finance	Amount (US $)
IDB 1/	784,000
Ford Foundation	125,000
Rockefeller Foundation	44,000
IDRC (Canada)	125,000
Inter-American Foundation	75,000
Shortfall (on September 30, 1974)	280,000
Total	1,433,000

In addition to this core-support of its programme, ECIEL has been actively looking for additional support earmarked for specific studies 2/ in specific areas. The proposed study should be included in this category. Such studies will benefit from the common approach used by ECIEL in all countries - an approach which includes similar methodologies, and systematic comparisons of techniques and results. They shall also be immune against past ECIEL procedures which, by over-emphasizing the comparability aspects of works carried out in different countries, have sometimes tended to delay the release of research findings. All this should be kept in mind when evaluating the proposed contracting of ECIEL to carry out the present study.

Work on the present study is expected to start in January 1975. A first draft of the report will be due in December 1976. The final draft is expected in June 1977. It is proposed to disburse one-third of total project costs upon initiation of the study, one third upon submission of a progress report showing that substantial results have already been obtained, and the remaining upon completion. The Bank staff member responsible for monitoring the project is Jean-Pierre Jallade, CPS, Education Department.

1/ The IDB contribution is earmarked for the support of joint studies in about ten countries.

2/ That is, studies which are already included in the overall research proposal but which are also subject to additional specifications concerning location, timing and content.

IV. BUDGET

		FY 75	FY 76	FY 77	Total	Overhead	Total
	Man-Months						
Research Staff[1/]							
Professional		6	12	6	24		
Assistant		6	12	6	24		
	000' US $						
Research Staff[2/]							
Professional		10.0	20.0	10.0	40.0		
Assistant		6.0	12.0	6.0	24.0		
Total		16.0	32.0	16.0	64.0		
Data Processing		2.0	5.0	3.0	10.0		
Travel		1.0	2.0	-	3.0		
Total		19.0	39.0	19.0	77.0	19.0[3/]	96.0

1/ Research staff from the member institute designated by the ECIEL coordination including local consultants if necessary.

2/ Based on a gross yearly salary of US$20,000 for a professional researcher and of US$12,000 for a research assistant.

3/ These funds - one-fourth of the total costs of the study - are earmarked for overhead expenses such as the ECIEL coordination in Rio, the twice-yearly seminars involving all member institutes and technical assistance from outside consultants.

SUMMARY OF RESEARCH PROPOSAL

The Determinants of Schooling in Northeast BRAZIL

I. GENERAL OBJECTIVES AND STRATEGY

The main objective of the present study is to analyze the process of educational growth in the backward areas of Brazil. This study will focus on the determinants of schooling as they result from supply factors originating in the country's overall education and employment policies and from demand factors originating in the household. The study has direct policy implications in this area of Brazil where enrolment ratios lag far behind those of southern Brazil. It will help to design the optimum mix of policies which will raise enrolment ratios to levels comparable to those of richer states.

II. TECHNICAL ASPECTS

The chief question to which this study addresses itself to is: what determines the amount of schooling obtained by an individual (with secondary emphasis on the type of schooling)? The amount of schooling received by an individual will be measured by two different variables, namely, (i) the number of years of schooling and (ii) the amount of money spent by either the student or the parents in order to obtain it. The analysis will include household variables such as: sex of the individual, income of the household, number of members, number of children of school-age, education and occupation of the parents and the like. Out-of-household factors will include overall employment and economic conditions, physical availability of schools, structure of the educational system, the extent to which education is subsidized, etc. The study will also yield estimates of the income and price elasticities of spending on education and also of cross-price elasticities.

The approach selected for the present study is an empirical one. The simple and multiple regression model will be used as the main tool of analysis. The study will be restrictied to eight or nine years of basic education, i.e., primary plus secondary education. Household data will provide the main basis for the present analysis. The study will draw on existing surveys su as those carried out by ECIEL, IBGE and SUDENE. In addition, detailed information about the school system will be collected from the state education agencies whenever necessary for the analysis.

III. ORGANIZATIONAL ASPECTS

The study will be commissioned to ECIEL, 1/ a private international organization based in Rio which comprises about 25 Research Institutes located throughout Latin America. The study will be carried out as part of the ECIEL program on "Education in Latin American Economic Development" by a research institute designated by ECIEL. The study will benefit from the common approach used by this organization in all countries - an approach which includes similar methodologies, and systematic comparisons of techniques and results.

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IV. BUDGET

	FY 75	FY 76	FY 77	Total	Overhead	Total
1/ Man-Months						
Research Staff						
Professional	6	12	6	24		
Assistant	6	12	6	24		
2/ 000' US$						
Research Staff						
Professional	10.0	20.0	10.0	40.0		
Assistant	6.0	12.0	6.0	24.0		
Total	16.0	32.0	16.0	64.0		
Data Processing	2.0	5.0	3.0	10.0		
Travel	1.0	2.0	-	3.0		
Total	19.0	39.0	19.0	77.0	19.0 3/	96.0

1/ Research staff from the member institute designated by the ECIEL coordination including local consultants if necessary.

2/ Based on a gross yearly salary of US$20,000 for a professional researcher and of US$12,000 for a research assistant.

3/ These funds - one-fourth of the total costs of the study - are earmarked for overhead expenses such as the ECIEL coordination in Rio, the twice-yearly seminars involving all member institutes and technical assistance from outside consultants.

JPJallade:nm
September 1974

ESTUDIOS CONJUNTOS SOBRE INTEGRACION ECONOMICA LATINOAMERICANA

(ECIEL)

A PROPOSAL

FOR RESEARCH

ON

EDUCATION IN LATIN AMERICAN

ECONOMIC DEVELOPMENT

SUBMITTED

BY

THE ECIEL PROGRAM

May 10, 1974

FOR INFORMATION
CONTACT:

Joseph Grunwald
General Coordinator
ECIEL Program
The Brookings Institution
1775 Massachusetts Avenue, N.W.
Washington, D.C. 20036
Telephone: 202/797-6159

CONTENTS

P R E F A C E

At the Twentieth ECIEL seminar held in San José, Costa Rica in July 1973, twenty of the twenty-eight ECIEL institutions decided to participate in a major study in the field of education and development, provided adequate resources could be obtained. (A list of the institutions, which covers sixteen Latin American countries, is attached.) Several preliminary working papers were presented at that seminar and it was agreed to explore the field further with the view of preparing a project proposal. A working group was appointed consisting of the following persons: Adolfo Canitrot (Instituto Torcuato Di Tella, Argentina), Claudio Castro (Planning Ministry, Brazil), Adolfo Figueroa (Centro de Investigaciones Sociales, Económicas, Políticas y Antropológicas, Catholic University of Peru), Alejandro Grajal (Centro de Estudios del Futuro de Venezuela, Venezuela), Ernesto Schiefelbein (Regional Employment Program for Latin America and the Caribbean;International Labor Organization, Chile), and Marcelo Selowsky (International Bank for Reconstruction and Development). Denisard Alves (Instituto de Pesquisas Económicas, Universidad de Sao Paulo, Brazil) joined the group later.

The working group met in early November after resources for the planning of the project became available. With the participation of members of the ECIEL coordination, a number of general research questions were outlined. Participating ECIEL institutions sent additional proposals and reactions about the planned project to the ECIEL coordination.

A second workshop was held in early January 1974, just prior to the Twenty-First ECIEL seminar in Rio de Janeiro. Eight working papers were presented for discussion to the workshop which was attended by most members of the originally appointed working group, the full ECIEL coordination team and outside consultants. (A list of persons participating in the Rio workshop is attached.) On the basis of the discussions at the meeting, a paper was prepared which constituted the framework for the proposed project and which was presented to all the ECIEL seminar participants. The research framework was reviewed in working meetings and individual sessions with staff members of ECIEL institutes committed to participate in the proposed studies. Following the seminar, several ECIEL institutes presented to the coordination outlines of research avenues together with some indications of data and resource availabilities.

During March 1974, Adolfo Canitrot, Claudio Castro and Philip Musgrove prepared preliminary drafts of proposals for specific studies in the project, derived from the previous workshop discussions and from the further reactions received from the participating ECIEL institutes. These drafts were reviewed by the consultants who attended the January workshop. Martin Carnoy, Richard Eckaus, and Finis Welch gave especially helpful comments. Their critiques were the basis for revisions by Jorge Sanguinetty and a final rewriting by Philip Musgrove of the drafts which form the basis of the present proposal.

LIST OF ECIEL INSTITUTES WHICH EXPRESSED THEIR INTENTION TO PARTICIPATE IN THE PROPOSED PROJECT

Country	Institution
Argentina	Instituto Torcuato Di Tella
Bolivia	Instituto Boliviano de Estudios Económicos (IBEE) - La Paz
	Instituto de Estudios Sociales y Económicos (IESE) Universidad de San Simón - Cochabamba
Brazil	Instituto Brasileiro de Economía Fundação Getulio Vargas Río de Janeiro
	Instituto de Pesquisas Económicas Universidad de Sao Paulo
Central America	
Costa Rica El Salvador Guatemala Honduras Nicaragua	Secretaría Permanente del Tratado General de Integración Económica Centroamericana (SIECA)
Chile	Centro de Estudios de Planificación Nacional (CEPLAN) Universidad Católica de Chile
	Departamento de Economía Universidad de Chile
	Instituto de Economía Universidad Católica de Chile
Colombia	Centro de Estudios Sobre Desarrollo Económico (CEDE) Universidad de los Andes
Costa Rica	Instituto de Investigaciones Escuela de Ciencias Económicas y Sociales - Universidad de Costa Rica

Country	Institution
Ecuador	Instituto de Investigaciones Económicas, Pontificia Universidad Católica del Ecuador
	Junta de Planificación
Mexico	Centro de Estudios Educativos
	El Colegio de México
	Dirección General de Estadística - Ministerio de Industria y Comercio
Paraguay	Centro Paraguayo de Estudios de Desarrollo Económico y Social (CEPADES)
Peru	Centro de Investigaciones Sociales, Económicas, Políticas y Antropológicas (CISEPA), Pontificia Universidad Católica del Perú
Uruguay	Departamento de Investigaciones Económicas - Banco Central del Uruguay
Venezuela	Centro de Estudios del Futuro de Venezuela

List of Participants in

EDUCATION AND DEVELOPMENT WORKSHOP
Rio de Janeiro, Brazil January, 1974

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EDUCATION IN LATIN AMERICAN ECONOMIC DEVELOPMENT

AN ECIEL RESEARCH PROPOSAL

Outline of the Project

The member institutes of ECIEL propose to investigate the relations between education and the economic and social development of their respective countries. Because the subject is so vast, some limitations must be imposed before research topics can be defined. "Education" will refer primarily to formal schooling, with some attention to apprenticeship and job-related training. The aspect of "development" to be emphasized is the level and distribution of income. Income distribution is of increasing concern in the region, as development ceases to mean simply growth in per capita income, and it is also the subject of a current ECIEL study.

There are two major links between education and income distribution. The first is that education generally raises the incomes of individuals. If it does this by making them more productive, it increases total income as well as affecting its distribution. (Education may however simply give people access to better-paying jobs, even displacing other people from them; then there is a distributional effect but no contribution to development.) To the extent that education meets needs for educated labor in certain sectors or industries, it also affects the composition of income and growth. The second link is that higher incomes make it easier for people to finance education for themselves or their children.

If both these mechanisms operate, then education becomes an important way of perpetuating the income distribution from one generation to another. It may also be a means of modifying that distribution, particularly if the way education is financed has important distributional consequences.

It is proposed to investigate these two links separately. One side of the project will treat the effects of education in different sectors of the economy. The other will consider the educational system itself and the factors determining the amount of education received by individuals. This separation permits manageable studies to be defined, which in addition to providing information and analyses that may be useful in the formation of public policy, can serve as a basis for later investigations of the varied and complex relations between education and development.

The first part consists of two studies, which can be undertaken largely or entirely with existing information (including data gathered in previous ECIEL projects). Partly for that reason and partly because of greater conceptual simplicity these two studies can be undertaken jointly by most or all ECIEL institutes collaborating on the project.

(1) Costs and the financing of the educational system. Here the object is to discover what it costs to produce the education people receive, how different costs are related to differences in quality or in efficiency, and how these costs are met. The analysis will be based on data generated by the school system.

(2) Determinants of the amount of schooling received by people now of school age, and of the expenditure on education. Here the object is to

relate schooling to characteristics of the individual and his family, while controlling for differences in the supply of schooling available.

The second part of the project will be treated quite differently. There is a wealth of evidence that education raises income, but little knowledge of the mechanisms involved or of their relation to other factors. Therefore, three pilot studies will be undertaken, each in one or two countries, to explore these questions.

(3) Education in the modern urban sector. Here the object is to discover the importance of education to the acquisition and productivity of employment in the modern sector, and the consequences for income distribution in that sector.

(4) Education in the traditional urban sector. Here the object is to learn how education affects people's entry into this sector (by rural - urban migration) and their exit from it (to employment in the modern sector), as well as to judge its effect on employment and income distribution within the sector.

(5) Education in the rural sector. Here the object is to understand how education is provided and obtained in rural areas, and how education affects employments, incomes, and the propensity to migrate.

Each of these pilot studies will require considerable methodological development and the conduct of new surveys to obtain the desired information. At a later stage, the findings will be analyzed to see how education affects the distribution of income among sectors.

Another group of studies, which is not described in this proposal but which is of importance for the aspects of development less directly related to income generation and distribution, concerns education and family behavior.

It is hoped to analyze in future studies the relation of education to saving, fertility, nutrition and health: all these are connected to income, but are also of direct importance for human welfare.

The study of education in the process of economic development is a new field of inquiry everywhere, but in Latin America in particular few economists have had significant experience in this area. There is an abundant literature on education in general (for Chile alone, a bibliography - not appended here - containing 764 entries for the period January 1970 to October 1973 was presented to the ECIEL seminar in Rio de Janeiro in January 1974): nonetheless Latin American work relating education to development is limited. Moreover, most existing studies do not consider the questions which now seem important and to which the present proposal is addressed. (See the appended Selected Latin American Bibliography; references to the studies mentioned in the text of this proposal, which are more concerned with these questions but which are mostly non-Latin American are appended separately.)

It should not be surprising that the ECIEL institutions have had little, if any, opportunity to work in this field. Thus an important by-product of the proposed studies will be a mutual learning process and the development of research capacity in Latin America which is expected to contribute to better formulations of policies in education and related areas.

In all the studies to be undertaken, the object is to add to substantive knowledge, to derive insights and conclusions with implications for policy, and, as a byproduct, to use the ECIEL network to spread and strengthen the capacity for valuable economic analysis of the region's development needs.

The Specific Studies: Joint Studies

I. THE DETERMINANTS OF SCHOOLING

Introduction

The amount of schooling received by an individual, although affected by many non-market factors, can be regarded as determined by demand and supply, just as for any other good or service. It is, however, difficult to distinguish demand and supply, unless strong simplifying assumptions are made about supply (such as that it is perfectly elastic at a given cost). It is analytically much easier to distinguish between those determinants originating in the household and those originating outside it, as in the labor market and the educational system: the former largely coincide with demand, while the latter mix demand and supply considerations.

A second distinction is between the number of years of schooling (and the type of schooling) received by an individual, and the amount currently spent by him or by his family to obtain it. Such expenditures are not uniquely related to the schooling received, because of differences in cost among types of schools, among different places, and over time. The cost of schooling in foregone income also varies according to the level and type of education already received, and to other characteristics of the individual or household. The two variables differ also in that schooling is a stock, while expenditures are a flow.

Research Objectives and Methods

Years of Schooling Received

The chief question to be answered is: what determines the number of years of schooling obtained by an individual (with secondary emphasis on the type of schooling)? For a group of people facing essentially the same

conditions of supply (physical availability, quality and cost of schooling), this question can be largely answered with information about the individual and his family, taking account particularly of the following variables: sex of the individual, income of the household, number of members, number of children of school age, education, age and occupation of the parents. Under these equal supply conditions, it is differences in demand which determine who goes to school. When supply conditions vary across the population studied (either spatially or over time), differences in these conditions must be taken into account. More generally, external factors as well as household characteristics must be considered. The most important of these are the supply of schooling, and the prospects and conditions of employment for school-leavers. The latter influence both the cost of schooling and the return to education, while the former (supply) can be considered to affect only costs.

Both of these extra-household effects can in principle be analyzed by time-series data, but it would be difficult to separate the intra-household and extra-household effects over time, except in studying the short-run effect of changes in employment or income on enrollments. When unemployment rises, children may have to leave school, or delay entering it, in order to help support the household. On the other hand, when unemployment is high the indirect costs of staying in school (in income foregone) diminish, and the demand for education may rise because the educated suffer less unemployment. Simple relations can be estimated from aggregate data between economic conditions and enrollment rates, but the distributional impact on schooling received can be better studied if household data are also used. Time-series results can be complemented by comparative (inter-regional, inter-national or inter-group) cross-section relations.

Changing economic conditions may also affect the expectations of individuals and their families, and therefore their willingness (apart from their ability) to acquire education. This effect might be studied by comparing cohorts of parents with similar educational levels, to see whether there are systematic differences in their determination of the schooling their children receive. Such an effect might not, however, be separable from the effects of income and age.

It is not possible simultaneously to take account of differences in intelligence or "educability" unless such information is available in school records and the individuals tested can be identified so that they or their families can be interviewed. This extension of the analysis is desirable, but is costly to undertake and may, when many variables are considered together, be difficult to interpret. A simpler approach is discussed below.

Given information about the individual and the household and the relevant factors, the basic objective can be put in two slightly different forms: (1) to explain the schooling of an individual, and (2) to discriminate among individuals with different levels of schooling at the same age (in order to remove purely inter-generational effects). The first requires multivariate regression, using as the dependent variable children's years of schooling, or the years deflated by age, or the educational "deficit" (expected less actual schooling, given age), or a similar measure. In the independent variables, one must choose related measures of income and of household size: whether total income per capita, or income per adult equivalent consumer is appropriate, for example, and other explanatory variables. To the extent that parents educate their children in order to raise their "quality" and usefulness, substitution occurs between the number of children and their quality, including their education, at a given income. It may also be impor-

tant to take account of age differences among children in a household. Given very imperfect capital markets for financing private educational expenditure, a family's ability to educate its children may depend on their spacing as well as on their number.

External factors enter the regression analysis whenever observations are drawn from different places or times, or whenever household observations are grouped for analysis, with the groups distinguished by different supply or labor market conditions. Appropriate independent variables must be constructed to measure supply, using information obtained from the school system.

All the variables discussed so far can be observed. It might also be valuable to take account of two unobservable variables: there are the permanent or normal income of the household (correcting for transitory effects in the observed income, which are likely to be large in short-period data), and the income expectations which a family has for its children. Both can be estimated (by regression analysis) from the observed data for all households together, although there are some difficult methodological questions to resolve in doing so. In particular, to judge the income which a family expects for its children as a result of their education, assumptions must be made about the horizon employed (whether lifetime earnings or initial out-of-school income) and about the dependence of such expectations on the careers of parents and on changes over time in the economy. The ECIEL study on wage determination (ECIEL, 1974) is a source of estimates of threshold education levels "required" for particular occupations and incomes, and thus of expectations. (Although the expectation may be inaccurate because educational requirements change with the supply of educated people, familes may not take account of these changes.)

The second approach - discriminating among people by level of education -

calls for the use of analysis of variance, tests of distributions, or discriminant analysis to determine what systematic differences there are between those who do, and those who do not, complete a particular level of schooling. It is important in this analysis to control for age, since when enrollment rates change over time there will probably be shifts in the characteristics of the enrolled. In addition to comparisons of mean family income, comparisons should also be made of the distribution of income for different schooling levels, to see whether only the low end of the distribution or whether the entire curve is shifted, from one level of schooling to another. It should also be possible to examine, using school records, the distribution of intelligence (as measured by some standard test) of those in school at different levels of age or schooling. Provided income or status could also be known, this would show whether ability has any independent effect on a child's staying in school.

Expenditure on Education

Because educational expenditure and schooling received are strongly, though not uniquely, associated, many of the variables determining the latter can be expected also to influence the former. Nonetheless it is valuable to distinguish the two questions, so as to tell how important the direct costs of education are in determining the decision to remain in school or to leave. It can also be seen whether these costs (expenditures) differ systematically for different groups (defined by location, income and other features) in the population. Only household budget data are suitable for this type of analysis. Multivariate regression is an appropriate technique, but the same problems of choosing dependent and independent variables arise as in explaining the years of schooling received. It is particularly important to work with expenditure per child, perhaps also adjusted for age or school level.

The simplest approach is to estimate single equations explaining some measure of expenditure. This is easily done, but it has the disadvantage of not showing how the decision to spend on education is related to the other expenditures of the household. The latter can be analyzed by constructing a multi-equation demand system, provided it can be assumed that supply or external conditions are the same for all households. Thus system estimation is limited to cross-section data with homogeneity of supply. Comparisons of parameters could be made after separate estimation for two or more populations.

This analysis permits estimation of the income- and price-elasticities of spending on education, and also of cross-price elasticities. Thus, it may be that for low-income families the price of food is an important determinant of educational expenditure, for example. The only other way to measure price responses is by analyzing grouped data, where prices or supply conditions of education are homogeneous within a group and vary among groups: geographic regions might be suitable for such analysis. System estimation may also yield estimates of threshold spending levels on education. Alternatively, direct estimates of such thresholds might be computed from exogenous price information and from estimates of the physical minimum requirements of a household for sending children to school (including adequate clothing and nutrition as well as the costs of books and materials and school transport).

Another question to be investigated with income and expenditure data is whether labor force participation appears to be affected by the decision to spend on education. Parents may be more likely to work, or to hold multiple employments, in order to keep children in school; or some children in a family may be more likely to work in order to finance the eduction of siblings.

Sources of Data

Either of these analyses can be applied to appropriate cross-section data using the household as the unit of observation. Census data offer very large samples and cover (in principle) the entire population, but they have the disadvantage of giving no, or not very reliable, information about income and expenditure. Household survey data, such as the ECIEL samples and several other sources, provide the latter information but are restricted in size and coverage. In all countries, a mass of comparable demographic/educational data is available for the major urban centers; in some cases there are comparable rural or country-wide household surveys. In practice, it may be desirable to make joint use of census and household data. The household data may also be used to determine which characteristics available in census data are most related to the nonavailable variables, and the census data can be used to judge the representativity of the household samples, particularly for higher levels of education.

The currently available data should be adequate for studying the determinants of primary and secondary schooling. One limitation of survey data is that they do not always indicate whether a person is currently attending school, so it is not certain when his education was received or how it is related to current household variables. Another is that information often refers only to children living at home. This limitation may be serious for children of university age, but is insignificant for young children (information on children in boarding school can usually be obtained).

Cross-section data can be used to show time profiles, in two ways. The simpler is to compare surveys taken at different times, such as the 1960 and 1970 censuses. The other is to stratify the population by age and see whether the relations examined are different for different age groups and thus are presumably shifting over time. For educational policy, it is important to

know what relations hold for those people now in school or approaching school age, and these may differ from the relations which determined the schooling of their parents' generation. The chief limitation on stratification (whether by age or by other characteristics such as household size or the attributes of the parents) is the small size of the household samples.

The other data sources of interest here are school records of age, schooling level, and some measure of intelligence or ability, together with indications of household income or status; regional and/or time-series information on unemployment by age and schooling level; and regional and time-series information about the supply of schooling (physical availability and price) generated by the school system. The intention throughout is to use primarily existing information rather than to undertake new surveys.

A Note on Previous Investigations

The importance of understanding how households assign resources to education is emphasized by Edwards and Todaro (1973). The importance of the price (or cost) of schooling is noted by Campbell and Siegel (1967). Other studies using aggregate cross-section or time-series data in the U. S. and Canada - Galper and Dunn (1969), Crean (1973), Gustman and Pidot (1973), De Prano and Nugent (1968) - indicate the weight of external factors, particularly of costs and unemployment, or of the "profitability" or rate of return expected from additional education. Some of the difficulties of estimating such a rate are noted by Carnoy (1973, pp.62-63) and Eckaus (1973). Further evidence on the importance of supply prices comes from Welch (1966). The connection between these factors and private demand for education - in particular, the reason why demand may consistently exceed both educational supply and the demand for educated labor - is discussed by Edwards and

Todaro (1973, 1974) and treated in detail by Carnoy (1973, 1972), using Brazilian data analyzed by Langoni (1970, 1972) as well as evidence from Puerto Rico and other less-developed countries.

Studies by Bowles and Gintis (1973) and Hansen et al. (1970) suggest that family background is very important in determining the income associated with a given level of education. Intelligence or ability appears to be important, after considering other factors, only for those with low education. To the extent that families invest in their children to assure them future income, the same factors should influence the demand for education. Investment to create a consumer durable for the utility of parents, rather than for children's future benefit, is treated by Willis (1973), De Tray (1973) and Becker and Lewis (1973); these analyses emphasize the relation between number of children and their "quality", including education. They also stress the complexity of household decisions and the importance of intra-household characteristics.

Much of the work cited has the disadvantage either of a very high-level of aggregation, or of emphasis on the United States and other high-income countries. Some evidence for less-developed countries is assembled and analyzed by Carnoy (1973), and a short bibliography is provided by Schiefelbein (1974) for Latin America. There is not yet, however, a systematic set of answers to the questions posed here: some are treated in the studies of Drysdale (1972), Selowsky (1968) and Carnoy (1972).

II. COST AND FINANCING OF EDUCATION

The objective of this part of the project is to study the cost of producing formal education, to learn how these costs are determined and how they are distributed, and to see what relation they have to the output of the educational system. The topic is of great significance for the relation of education and development, first because educational costs in the aggregate are large and growing rapidly; and second because the structure of those costs, and the ways they are financed, have important distributional consequences about which very little is known.

Because education, or schooling, is not a homogeneous good, there is some difficulty in measuring the output of the educational system. Two approaches will be followed to quantify the product whose costs are to be studied. One is to count the number of graduates from a given level of education, per entrant to that level, taking no account of differences in quality either among students or in the schooling they receive. This procedure is easy to apply (since the necessary data are readily available). Moreover, it may be the measure of output which is implicitly used by the labor market in evaluating applicants, all people with the same educational level being considered equal. The second approach is to measure production by an index of quality, based on standarized tests of achievement. Some of the difficulties of this procedure are discussed later.

Given a measure of the production of schooling at each of several levels (primary, secondary, university or vocational), the questions about costs to which answers will be sought may be organized as follows:

(1) What is the variation in unit cost, and with what factors are different cost levels associated?

(2) How is the cost divided among different factors or inputs used to produce schooling (teachers, buildings, equipment, materials)?

(3) In publicly supported schools, how are the costs divided between the public sector and the student or his family?

(4) How are the costs borne by the public sector financed?

These questions are related to the efficiency of the system in the narrow sense of how well it uses inputs to produce output. In particular, it is of interest to know whether variations in cost are reflected in variations in the quality of output; whether they reflect quality differences in inputs, either educational inputs or the entering students themselves; or whether they simply indicate variations in efficiency of resource use. There is considerable debate over this issue in the United States (Coleman, 1966; Jencks, 1972), and a good deal of evidence has been gathered to suggest that raising costs or inputs need not generally result in greater output. The estimation of such relations must take account of differences among students when they enter the school, as in the studies by Bowles (1970) and Bowles and Levin (1968).

It must be noted that in attempting in this way to measure the efficiency of the educational system, or to explain cost variations, reference is made only to what the system is actually trying to produce (which requires some analysis to ascertain). The study is not intended to answer the much more difficult questions of what the system ought to be producing, or of its efficiency in meeting the needs of society and the economy (Carnoy, 1973:22). It may serve as a basis for, but it is not intended to be, an analysis of the proper strategy of investment in education (Simmons, 1973). Nonetheless, the narrower concept of efficiency is important to study, because of the considerable, scattered evidence of inefficiency, or at least

of great variations in unit cost, in Latin America (Castro, 1974a).

Some of the variables to be examined for their possible effect on costs are size of school or class, location, quality of teachers (as measured by their own schooling, salaries, time devoted to teaching, etc.), quality and utilization of buildings and equipment, and characteristics of entering students. Among the latter, the most important are likely to be intelligence, achievement in previous level(s) of schooling, and family background and income. In examining these factors the study will interact closely with the study of the determinants of schooling (Part I of this proposal). These variables may be studied at the level of individual schools (using information aggregated over all the students in each, or aggregate characteristics of the region served by each school) or among individual students (pooling observations over a sample of schools). Quality of input to one level of education may be measured, in part, by quality of output at the preceding stage.

The basic questions are also related to the distribution of the cost burden of the educational system. In this respect it is particularly important that throughout Latin America the share of direct educational cost (excluding foregone income) borne by the public sector tends to rise with the schooling level. University education may have almost no direct cost to the student, while secondary schooling is expensive. The distribution of schooling thus includes a large element of subsidy to students from high-income families. Poorer students cannot take advantage of the subsidy because there is no capital market for financing their secondary education. Besides being inequitable, this arrangement may be inefficient as a rationing device (Selowsky, 1973). Within a <u>given</u> level of schooling, there may be distribu-

tional inequities between urban and rural areas, among regions, or among ethnic groups. Such inequities will arise even if there are no differences in the direct costs to students, if there are differences in the public costs, in the quality of schooling, or in the quality of entering students.

Finally, the way that public costs (that part not paid by the student in tuition or fees) are financed also has significant distributional consequences. To study these in detail would require assessing the incidence of the various taxes from which educational expenditures are met, as well as assumptions about the share of each of those taxes in meeting total costs. The available estimates are not very satisfactory for this purpose (Bird and DeWulf, 1973) so that this aspect of the study probably cannot go beyond description of the sources of revenue. Some assessment may be possible of the redistributive effects among regions, particularly when education is financed partly from national and partly from provincial or municipal sources.

To answer the four questions on which the analysis is based, most of the data needed can be provided by the school system. Certain problems nonetheless deserve emphasis. The difficulty of measuring output has been mentioned. When standardized measures of quality are not available (within one country or among countries), some research will be needed to make comparable the different standards used. Information on the quality of entering students may not be available, requiring that estimates be made by taking special surveys of students in a representative group of schools. Exogenous information is of course needed to estimate the indirect costs of attending school, in income foregone; such estimates can be drawn from existing studies and from the study of schooling determinants. Even the information on costs endogenous to to the school system, particularly capital costs, may require revision or

exogenous verification. Bookkeeping practices do not necessarily reflect true economic costs (Castro, 1974a).

The study can probably draw on a great deal of published or readily available information to answer the simpler questions about costs and financing, and the first step must be to examine and synthesize the cost data in each country. Only recently has theoretical attention been devoted to the relative importance of different factors in determining costs and outputs (Selowsky, 1973: 48-60) and the associated needs for information. Detailed studies of cost and financing are very few in number in Latin America (Barkin, 1971; Muñoz, 1967) and still more rarely are the distributive implications analyzed with consideration of the sources of finance (Jallade, 1973a, 1973b).

This study may be expected to have implications for educational policy (apart from possible implications for policy in other sectors) in two respects. The first is to indicate inefficiencies in the use of educational resources, and ways in which costs might be reduced without sacrificing educational output in quantity or quality. The second is to quantify inequities in the provision of schooling, and thereby to serve as a basis for changes in the way education is financed. One proposal of this sort is to raise tuition to cover the direct costs of higher education, and at the same time to introduce loans which would allow low-income students access to such schooling (Selowsky, 1973: 50-62; Jallade, 1974). Other possibilities involve changes in those elements of cost, direct or indirect, which have the greatest distributional impact.

The Pilot Studies

The question of what effects education has on development is inherently more complex than the questions related to the provision and distribution of education to which the previous two studies are addressed. In the past, there have been two principal approaches to the question: measures of the rate of return to education, and estimates of the requirements for education as a function of needs for different kinds of trained manpower. The ECIEL project is intended to draw on what has been learned from both these lines of investigation.

The manpower approach (Harbison and Myers, 1964) in effect supposes that certain occupations or jobs must be expanded for development, and that these positions have relatively inflexible educational requirements. Unemployment is determined by excesses of supply of people at particular educational levels, and the overall distribution of income is determined by the supply/demand balances at each level.

The rate-of-return approach (Psacharopoulos, 1972) in effect supposes that income is determined by education, which is a form of capital (Becker, 1964; Schultz, 1964; Blaug, 1970). The distribution of income is related to the distribution of schooling, but it is not clear, without much further study, how this depends either on the occupational structure or on the supply of people with different levels of schooling. The incorporation of these factors into such models is only beginning (Thias and Carnoy, 1972).

At this point, neither approach is entirely satisfactory, but the results of each, and recent historical experience in Latin America and in less developed countries generally, give us evidence for the following propositions:

(1) 'requirements' for many jobs are flexible and adjust to supply, education becoming more of a screening device than a necessity;

(2) partly for this reason, high individual returns to education do not imply high social returns;

(3) rates of return behave very differently across occupations (Eckaus, 1973) and, over time, for different levels of education (Carnoy, 1973; Carnoy and Marenbach, 1973);

(4) the return to education may actually be due to other characteristics of the individual or his family (Gintis, 1971; Castro, 1974 b), whether or not income is associated with productivity; and

(5) imbalances - which are seen to be very difficult to measure - can and do occur not only among levels of education but between education and other types of capital (Carnoy, 1973), leading to the growth of unemployment among the educated (Edwards and Todaro, 1973, 1974; Blaug et. al., 1969).

Past research in Latin America and elsewhere demonstrates that the effect of education is to a large extent a matter of how labor markets operate. Investigation of this subject is only beginning, so that despite a great deal of literature about education, we know very little of exactly how it is related to the probability of employment; to the type or types of work an individual performs; to mobility within occupations and among them; and to productivity.

Similarly, we know very little about which characteristics of education, and therefore which types of education or training, are significant for these relations.

This group of questions is the focus of this part of the ECIEL project. It is split into three sectoral studies because we expect that education does not have identical, or even similar, effects in all sectors of the economy - if only because they are characterized by quite different labor markets. Each study is designed as a pilot investigation, both because of the complexity and unfamiliarity of the questions, and because in order to study them thoroughly it will be necessary to obtain some new information by surveys. Each study will begin by reviewing the information and analyses which are already available, as a guide to new investigation. The extent of new data collection required will partly depend on the country or countries chosen to study. Once the effects in each sector are better understood, the results of the analyses can be combined to see how education is related to inter-sectoral income distribution and development.

The object, in each case, is two-fold. One is to extend the understanding of how education interacts with other elements in each sector to generate and distribute income. The other is to identify implications for public policy with respect to education, or with respect to labor markets, investment regimes, land tenure and other features which may be significant.

III. THE MODERN SECTOR

This sector is defined as consisting of relatively large, highly capitalized firms concentrated in urban areas (omitting from examination the modern enterprises occasionally found in rural areas). The object is to study the relations between the education of the work force and various characteristics of their present jobs and of their occupational histories. "Education" is taken to mean formal academic schooling, vocational or technical schooling, and organized on-the-job training.

With regard to present jobs, three questions are important:

(1) How far are educational requirements actually set by the nature of the work performed and how far do they respond to changes in the supply of educated workers? This information gives an idea of the extent of excess or "unrequired" education among those employed, considering only labor market "needs".

(2) How does education interact with ability or intelligence and with other features of the individual worker to determine his job, work pattern and income? This is a further way of estimating the necessity of education and of seeing what it contributes, beyond the other factors.

(3) How far are the different kinds of education substitutes for particular jobs or levels of skill (Castro, 1974c)? This, together with estimates of educational costs from Part II, provides data on the cost of providing a particular skill or job capacity in different ways.

With regard to occupational history, the chief question is how education affects an individual's probability of employment, his mobility among jobs and his advancement in terms of income. Such information, if obtained for the recent past for the same individuals, will complement cross-section

analysis, and may allow relations to be established between their occupational experience and changes over time in job educational requirements.

Four kinds of information contribute to this analysis:

(1) time-series data on employment conditions and labor supply by level of education;

(2) characteristics (size, capitalization, rate of growth, techniques, hiring practices) of individual firms, and their investment in on-the-job training (Mincer, 1962);

(3) expert consensus, among training personnel and employers, on job requirements and their relation to characteristics of work; and

(4) current characteristics, occupational histories, and job evaluations of individual workers (including their own estimates of educational needs and substitutability in their jobs).

The kinds of information sought include some relevant to manpower analysis as well as some relevant to rate of return estimation, and will be taken at several levels of aggregation. Data under (1) are readily available; (3) may be available, or can be obtained by consultation with employers and students of labor markets; (2) and (4) will be available in varying degrees in different countries and industries. A complete analysis will require new workplace surveys, to collect information on both the firm and the individual workers. The data collection can perhaps include short intelligence tests as well as interviews, so that the effects of intelligence or ability and education can be distinguished.

Such a survey, covering perhaps ten to thirty firms and a sample of perhaps five to ten thousand workers, will be the key element in answering the questions relevant to this sector. This is probably the only way to combine substantial cross-section data with historical information on indi-

viduals. At the level of the firm and of specific jobs, comparison will be made to the ECIEL study of wage and salary structures (ECIEL, 1974) in the modern sector, which is based on firm-level surveys conducted in 1968. A new survey will be designed to retain comparability with this study while expanding the scope of the data and of the analyses.

IV. THE URBAN TRADITIONAL SECTOR

The urban traditional sector consists of the self-employed and of workers in a variety of small-scale, not highly capitalized, enterprises in urban areas. The labor market in this sector is assumed to be more competitive - less restricted by the power of employers or labor organizations - than the modern sector market, and relatively open to new arrivals. It is also of interest for the relation between education and income distribution because it occupies a middle position between the other two sectors. Most immigrants to urban areas initially find work here (although a few get modern sector jobs); and most of the labor for expanding the modern sector is drawn from this group (a stable modern-sector labor force might be largely recruited from the children of workers already in that sector). Therefore education probably acts both to pull people into this sector, and to help them to leave it for more stable and better-paying jobs. It may also act to raise the incomes of those who stay in the traditional sector. If the labor market rewards individual productivity and is competitive, there is a presumption that in that case education raises productivity and does not act simply as a screening device for jobs(as it may in passing people into the modern sector). These are the guiding hypotheses of the investigation.

The questions to study then are:

(1) How does an individual's education affect his mobility into, through, and out of the traditional sector?

(2) How does education affect the type of employment and the income of those who do not leave?

(3) Is the schooling of children associated either with their parents' having migrated or with their having some work experience in the modern sector?

(This touches on the study of determinants of schooling, Part I, but asks whether there is an effect due to sector or to past migration and occupation.)

To answer these questions properly requires knowing people's migratory, educational and occupational histories, which may be best obtained by a new survey of the traditional-sector population. The sector is defined by employment conditions, but it cannot easily be studied in workplaces because of the great number of small, unorganized enterprises and individual employments. It is necessary, as in the rural sector, to take the household as the unit of observation, and then to create a sample corresponding to the traditional sector on the basis of employment of the household head. The sample can be drawn primarily from areas of a city in which most people are known to have "traditional" employments: there is a considerable base of information and previous studies about such "barriadas", "villas", or "favelas", or the so-called "marginal population". It will also be possible to draw on previous cross-section information such as censuses and city-wide household samples, including the ECIEL budget surveys (ECIEL, 1973). A sample of about 1,000 households, including 2,000 to 3,000 employed individuals will be conducted, probably proportionally to the estimated population of the sector.

The principal problems with this approach are those of sample bias, particularly because of people's self-selection into or out of the sector. The biases can be at least partly offset by linking this study to city-wide survey information and to the relations which emerge from the analysis of the other sectors. There are also advantages to the household survey approach, particularly the opportunity to compare current characteristics and occupational histories among members of a household, who may be employed in dif-

ferent sectors. The unemployed are also included.

Movements of individuals between sectors are of particular interest to study because past experience in a modern sector job may make it easier for a person to get such a job again, or may raise his productivity and income while he works in the traditional sector. In either sense, such experience may be a substitute for education. It will probably not be possible in this study to control also for the effects of ability or intelligence.

The principal policy issue to which this investigation is relevant, is how far education raises the productivity or standard of living of people in the traditional sector. Education is individually desirable, but not socially valuable, if it serves mainly to select individuals for the small number of modern sector jobs, but does not of itself create new employment in that sector. It is more valuable if it opens employment or raises productivity in a sector which does not also use large amounts of capital.

V. THE RURAL SECTOR

The role of education is studied separately in the rural sector, in part because in several respects that sector is more complex than the urban part of the economy. Since these differences shape the kind of investigation proposed, they are first briefly described. They apply particularly to areas characterized by numerous small farms. Plantation agriculture with hired, landless labor much more resembles the urban modern sector.

(1) Labor in rural areas can take at least three significantly different forms: work on one's own (household) farm; hired work on another farm; and non-agricultural labor, often in small towns.

(2) Landowners are entrepreneurs who must make production decisions, and they may be much more numerous in rural areas than entrepreneurs (owners of capital) are in cities. Their production possibilities are affected by the size of their holdings. This feature, together with the fact that some people do not own any land, means that the land tenure arrangement may fundamentally influence the effect that education can have on work patterns, productivity and income. In particular, education may acquaint people with choices which, because they own little or no land, they cannot put into practice.

(3) Choices of technique (introduction of different crops, seeds, fertilizers, machinery) must be made by a great many producers. The variety of these techniques and the choice of which one to use will be influenced by extension services, which are themselves a form of specialized education.

(4) In addition to the different kinds of labor, and the possibility of unemployment, an individual or household has the choice of migration. (People could, but seldom do, migrate from urban to rural areas, most migration is always toward a more densely populated place.)

(5) Agricultural labor is usually very seasonal, and rural incomes depend both on such labor and on the demand for off-season non-farm labor.

For these reasons, the study of education in rural areas is devoted primarily to three basic questions, each of which leads to some subsidiary questions:

(1) How does education affect the propensity of individuals and households to migrate? (Bowman and Meyers, 1967; Sjastaad, 1962). Does more education make migration more, or less, likely? How does the effect of education on migration depend on land tenure and on the local labor market?

(2) How does education affect the type of work an individual performs (own farm, hired farm labor, non-farm labor) and the pattern of that work throughout the year? (Brownstein, 1972). For hired labor, agricultural or not, how does education affect wages and income? Are there differences in this respect between farm and non-farm work?

(3) How does education affect production techniques, output, and income or profit for families working their own land? Are there <u>stable</u> differences in inputs or outputs among farmers with different levels of education? Are there differences in the <u>speed</u> of acceptance of new techniques? Does the effect of education depend on the size of landholdings? Does education affect income distribution (Gotsch, 1972) because of its relation to technical change?

The best, if not the only, focus of observation for these questions is the household. Thus household survey data are necessary, and will be collected by interviewing a fairly large number of households, probably between 500 and 1,000 in each of a few (not more than three) rural areas in a country. Stratified samples will be taken of households in different landholding

classes. Where possible, data will be collected from the household concerning family members who have migrated out of the area.

The areas selected for new data collection will be ones about which some information is available from the study of the cost and financing of education (Part II) so that account can be taken of the supply of schooling. If such an area cannot be studied, then some supplementary information on the school system in the area will be gathered as part of the survey. The area should exhibit some variety in landholdings and in the types of employment available; in other respects, it should be as homogeneous as possible. Existing data from censuses, school records, cadastral surveys and other sources will be reviewed before the new survey is undertaken.

The complexity of the relations to be studied, the costs of survey work in rural areas, and the number of variables which might be important but which will be impossible to study within the context of the present proposal (soil fertility, product and factor prices, characteristics of families who have left the area) require that the study be modest in its objectives. Nonetheless it should be possible to gain a great deal of information. In addition to its value for understanding the role of education in a rural setting, the study should yield implications for public policy toward some of the following questions, about which little is known at present.

(1) Is education likely to make land reform easier, or less difficult in terms of lost production? Conversely, do current land tenure patterns prevent individuals and society from benefitting fully from the investment in education? - that is, would land reform make education more valuable?

(2) How necessary is education for the adoption of technological change in agriculture? Is education a complement or a substitute for extension

services in fostering such change?

(3) If rural education is increased, is there likely to be any effect on agricultural output, or will the effects appear only in non-farm labor markets?

INTEGRATION OF THE STUDIES

Each of the three pilot studies will provide information on how education affects the level and distribution of income within a given sector of the economy. These studies will also give some indication of the way education affects income distribution among sectors, since they will include analyses of how education affects people's movement from one sector to another, by migration or by change of employment. In order to see more clearly the role of education in the economy-wide distribution of income, it will then be necessary to integrate the results of the three studies. Since these studies may be undertaken in different countries, this integration must abstract so far as possible from the characteristics of the particular countries. The object is to understand some general features of the way income is generated and distributed, so as to be able to provide answers to questions such as the following:

(1) Does education in the rural sector raise incomes there relative to the rest of the economy, or does it, by promoting migration, actually retard development in rural areas?

(2) Does education raise the incomes of those employed in the traditional sector, or is it of value to people in that sector only in so far as it enables them to find employment in the modern sector?

(3) Does more education, in each sector and in the economy as a whole, create employment and income, or does it simply allocate the available employment?

(4) Is education, considered as a productive input, scarce or abundant relative to other factors such as land, physical capital and intermediate goods?

While these questions are abstract and difficult to answer from the pilot studies, some understanding must be sought in order to learn how education is related to development of the whole economy and society.

Recommendations for educational policy may come from any of the five studies proposed here (including Parts I and II). All the studies must then be integrated so far as possible, to take account of all the effects of a particular policy. The studies may equally lead to recommendations for policy in other matters than education. Of particular importance are policies which affect the working of labor markets, the distribution of wealth in land, and the rate and type of investment in physical capital.

RESEARCH SCHEDULE

The project is expected to extend over five years. A budget estimate is presented for the first two years. At the end of that initial period preliminary drafts of the first results of the joint studies (Parts I and II) are expected to be completed, and the pilot studies (Parts III, IV and V) will have accumulated enough research experience to serve other ECIEL institutes as a guide to embark on these studies if further resources become available.

The proposed project can be initiated at the 22nd ECIEL seminar which will be held in Caracas from July 8-12, 1974. At that meeting specific methodologies would be discussed for the different studies.

The Joint Studies

It is estimated that most of the joint research described in Parts I and II of the proposal can be completed within two years. Preliminary drafts of some sections of these two studies (Determinants of Schooling, and Costs and Financing of Education) will be prepared before the end of that period and completed drafts of the first reports will be available by the end of the third year.

Subsequent publications for each of the two studies would provide additional analysis, including inter-American comparisons and some comparisons with other regions of the world. The preparation of additional reports is expected to take an additional two years, so that by the end of five years there would be one publication for each of the two studies and a second set in draft form.

The Pilot Studies

The basic pilot studies are expected to extend over a four year period. Within the first two years, the samples will be designed and tested, the

surveys completed and the resulting data cleaned. Processing and analysis of the information will take an additional year and drafts of the findings will be completed by the end of the fourth year.

By the end of the initial two year period the three pilot studies will provide the basis for replication or improvement of the research design in other Latin American countries, for subsequent international comparison. It is therefore expected that with adequate financing, many of the ECIEL institutes can study the effects of education in the different sectors of their countries within five years of the initiation of the pilot studies. The progress and results of the study will be reported in four kinds of documents:

(1) internal papers describing the methodology adopted and the preliminary results. Much of this material will be reported in the Summaries of the ECIEL seminars and will be available within a few months after each seminar.

(2) working papers reporting results of the study, prepared by individual institutes or by the coordinating staff. These will have been edited and reviewed by the ECIEL coordination.

(3) monographs published by the individual institutes, primarily for circulation in their respective countries. These will be useful for national policy makers as well as for a better understanding of country-specific problems.

(4) books, published by the coordination, to report the final results of the study. These will draw on the working papers and will summarize the results from different countries of different parts of the study. Their preparation may carry beyond the intended five-year span of the project. While the earliest publications will focus primarily on country studies, later publications will concentrate on inter-American comparisons.

BUDGET ESTIMATES

Resource limitations will make it impossible for all twenty interested ECIEL institutes to participate directly in this project.

Three budget alternatives are presented differing in the following three respects:

1. The number of participating institutes
2. The size of the surveys for the pilot studies
3. The intensity of human resource use by the institutes

The following assumptions are made for budget alternatives A, B, and C:

Budget A:

1. Twelve institutions will participate in the joint studies, involving twelve countries.

   Six countries will participate in the pilot studies with each pilot study carried out in two countries.
2. The coverage of the surveys will be sufficient to permit all of the analysis indicated in this proposal.
3. At least one senior researcher per institute will collaborate full time in the project. In addition there will be at least two full time research assistants per institute.
4. At the coordinating center there will be two full time technical coordinators with two research assistants each.

Budget B:

1. Ten institutions will participate in the joint studies involving ten countries; three institutions will participate in the pilot studies, with each study carried out in only one country.

2. The surveys will still be designed to answer the most basic research questions, but will be smaller and simpler to reduce costs.
3. Same as in A.
4. Same as in A.

Budget C:

1. Six institutions will participate in the joint studies involving six countries; three institutions will participate in the pilot studies as in B.
2. Same as in B.
3. One senior researcher per institute will collaborate half-time and one high level research assistant per institute will work full time in the project.
4. One full time coordinator at the coordinating center will be devoted to the joint studies and a half-time person to the pilot studies.

The implication of this reduced effort is that preliminary drafts of fewer sections of the project will be available at the end of the two-year period than under A and B.

The following budget estimates combine the costs for all participating institutes and the coordination, as indicated in A, B, and C above, for the initial two year period.

BUDGET A - 2 YEARS

(in thousands of US dollars)

	Total Cost	FINANCING From own & local sources	Required
Salary Costs			
Professional Staff	$ 980	$ 500	$ 480
Outside Consultants	60	–	60
Secretarial and Clerical	160	160	–
	1,200	660	540
Travel (including twice yearly coordination seminars) and Communications	280	140	140
Surveys	450	170	280
Computer and programming	250	150	100
Equipment, supplies and Publications	120	80	40
Total Direct Costs	2,300	1,200	1,100
Indirect Costs (20%)	460	240	220
	2,760	1,440	1,320
Contingencies (approx. 5%)	140	70	70
TOTAL	$ 2,900	$ 1,510	$ 1,390

BUDGET B - 2 YEARS

(in thousands of US dollars)

	Total Cost	FINANCING	
		From own and local sources	Required
Salary Costs			
Professional Staff	$ 750	$ 400	$ 350
Outside Consultants	60	-	60
Secretarial & Clerical	120	120	-
	930	520	410
Travel (including twice yearly coordination seminars) and Communications	230	120	110
Surveys	180	50	130
Computer and programming	160	100	60
Equipment, supplies and publications	100	60	40
Total Direct Costs	1,600	850	750
Indirect Costs (20%)	320	170	150
	1,920	1,020	900
Contingencies (approx. 5%)	100	50	50
TOTAL	$ 2,020	$ 1,070	$ 950

BUDGET C - 2 YEARS

(in thousands of US dollars)

	Total Cost	FINANCING From own & local sources	Required
Salary Costs			
Professional Staff	$ 550	$ 350	$ 200
Outside Consultants	60	-	60
Secretarial and Clerical	90	90	-
	700	440	260
Travel (including twice yearly coordination seminars) and Communications	180	90	90
Surveys	180	50	130
Computer and programming	140	90	50
Equipment, supplies and Publications	80	50	30
Total Direct Costs	1,280	720	560
Indirect Costs (20%)	256	144	112
	1,536	864	672
Contingencies (approx. 5%)	84	46	38
TOTAL	$1,620	$910	$710

ECIEL PROPOSAL FOR
RESEARCH ON EDUCATION IN LATIN AMERICAN
ECONOMIC DEVELOPMENT

SUMMARY OF BUDGET ESTIMATES
FOR 2 YEARS
(IN THOUSANDS OF US DOLLARS)

	Total	Financed from own and local sources	Required
BUDGET A	$2,900	$1,510	$1,390
BUDGET B	$2,020	$1,070	$ 950
BUDGET C	$1,620	$ 910	$ 710

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A correlation study of exploratory nature that analyzes the situation as to whether students selected for Medical School by the Centro de Selecao dos candidatos as Escolas Médicas e Biológicas (CESCEM) are more successful academically than those not selected by that system.

Brazil (cont.)

Gouveia, Aparecida Joly. O emprego público e o diploma de curso superior. Sao Paulo, 1972.
A reexamination of available data that attempts to research the possible relationship that exists between the attraction of serving as a public functionary and the opportunity to obtain a diploma of higher education.

Marsiglia, Joao et al. Demanda de mao-de-obra e necessidade de treinamento. Sao Paulo, 1971, 1972, 1973.
A series of three studies by SENAC in Sao Paulo that attempts to quantify the manpower needs by the indicated standards, to measure the necessity of professional formation in these areas and to propose possibilities of higher qualifications for the workers from these sectors with the objective of improving their profits.

Chile

Araneda, Mónica, Fernandoes, Isabel and Quintana, Soledad. Estudio de correlación y varianza entre las variables logro, inteligencia, edad y rendimiento escolar en los terceros y cuartos años de Enseñanza Media de algunos colegios de Viña del Mar. Santiago, 1971.
A preliminary work that studies the correlation and variance among the variables mentioned in the title (success, intelligence, age and scholarly efficiency) in two female secondary establishments and one male one in Viña del Mar.

Bravo, Luis. Repetición de curso y promoción automática en educación básica. Santiago, 1973.
Empirical study done with the support of 12 students from the School of Education that attempts to analyze psychological and pedagogical characteristics of students repeating the fourth year of Basic General Education and to further some considerations about the question of course repetition or automatic promotion.

Bruton, Henry J. Productividad de la educación en Chile. Santiago, 1968.
An original work that examines the role of education as a source of improvement of the quality of the labor force. Rates of return on education in Chile are discussed, as well as the hypothesis that explains these rates and their variations between diverse categories of education.

Cifuentes, Mercedes; Herrera, Marta; Guarda, Olga; and Cornejo, Luz Elena. Los recursos humanos en el desarrollo del país. Período 1960 - 1970. 1971.
An empirical study that diagrams and analyzes in diagnostic format the development of the human resources and their utilization during the decade 1960 - 1970. It attempts to serve as the basis for the elaboration of the annual operative plans and the medium and long range plans.

Chacón, Boris. Disponibilidad y utilización de mano de obra en Chile. Balance de mano de obra 1970 - 1976. Santiago, 1971.
An analytic and expanded document that presents the occupational prespectives of the Six-Year Development Plan for 1971-1976.

Corvalan Montenegro, Ana María. Una estimación de requerimientos de recursos humanos y su expresión en términos educacionales. Santiago, 1966.
Reexamination of statistical data relative to occupation and education, that attempts to estimate the requirements of the formation of human resources and the capacity of the education system to form the necessary resources.

Chile (cont.)

Elizaga, Juan C. Migraciones a las áreas metropolitanas de América Latina. Santiago, 1970.
An original work that analyzes the results of a survey of the population of Gran Santiago. Information was collected on living conditions, demographic characteristics, education, economy, their last place of residence, date of arrival of immigrants, their migratory history, motives, occupational traits before migrating, and on their first job in Gran Santiago.

Escudero Burrows, Ethel. Destino profesional de los egresados de la educación técnico-profesional de nivel medio en Chile. Santiago, 1969.
Research on the degree of accommodation among the education obtained from the mid-level technical-professional teaching establishments, the opportunities that are available to the student upon completion of his/her courses, and the requirements that the labor market has set for them.

Fischer, Joseph C. Factors Associated with college aspirations and expectations of Chilean secondary school pupils. Chicago, 1971.
A Ph.D. thesis that describes the factors associated with the aspirations and expectations of Chilean students in the selection of various types of secondary education, a choice that has to be made upon finishing primary education. It also deals with the choice between university and working careers, a choice to be made during the final year of secondary education.

Goldfarb, Marsha. Some Evidence on Educational Relationships in Chile.
A statistical analysis of factors related to the drop-out rate and to the influence of education on the private rate of return. The first part puts the two analyses inside a theoretical mark of costs and benefits and plants doubts about the convenience of attending to the growing demand for private education.

Herrick, Bruce and Morán, Ricardo. Declining Birth Rates in Chile and their Effects on Output, Education, Health, and Housing. Washington, D.C., 1972.
A reexamination of Chilean statistical population data allows the exploration and quantification of the future impact of fertility rates on the PNB, the per capita PNB, potential demand for education, health and housing services, and the resources necessary to satisfy this potential demand. It also deals with the effects of age of the population on the work force.

Instituto Nacional de Capacitación Profesional (INACAP). Encuesta sobre personal de nivel medio en la industria manufacturera de las provincias de Santiago, Valparaíso, y Concepción. Santiago, 1970.
An original work that analyzes the quantitative (number, distribution, agreements, promotions, retirement, origins) and qualitative (accomplished activities, schooling, deficiencies, service training, age and sex) characteristics of personnel.

Menanteau-Horta, Darío. Aspiraciones y logros vocacionales de la juventud en Chile, Resultados de dos encuestas: 1969-1972. manuscript to be published en la Revista CEE, 1974.
An original study that presents some results on educational aspirations and vocational plans of Chilean youth. It tries to determine the factors associated with the success or failure of a young person's intention to attend a university.

Menanteau-Horta, Darío. Perfiles vocacionales de los estudiantes de últimos cursos de enseñanza media en Chile. 1972?
A partial report on field research about educational aspirations, occupational plans, socio-cultural attitudes and values of the Chilean youth. It summarizes the characteristics of this sector of the population, discussing some relative findings about vocational orientation, and touches on the aspirations and occupational profiles that appear to be most attractive to the you

Chile (cont.)

Programa regional del empleo para América Latina y el Caribe (PREALC). El empleo y el proceso de desarrollo en Chile, 1960 - 1970. 1973.
A world-wide study on employment, and of the underployment situation in Chile in the sixties.

Schiefelbein, Ernesto. Hacia una evaluación de los estudios de recursos humanos realizados en Chile. Santiago, 1972.
An emperical work which tried to estimate the validity of the supply and demand predictions between 1960 and 1965 for the situation in 1970 for those professions that required a higher level of formal education (university, normal schools and technical institutes). Given the precision, three estimates for 1980 per career are made.

Schiefelbein, Ernesto and Farrell, Joseph. Relaciones entre los factores y los resultados del proceso educativo. Santiago, 1971.
A preliminary work that attempts to provide objective elements in the study of the existing relations in the educational process so as to give a better understanding of the decisions adopted in educational policy.

Colombia

Drysdale, Robert S. Factores determinantes de la deserción escolar en Colombia. Estudio de un caso de escolaridad rural primaria. Mexico, 1972.
In 1967 the Colombian government commissioned the preparation of a tax reform with the hope of increasing government revenues so as to offer primary education to all Colombian children.

Instituto Colombiano de Especialización Técnica en el Experior (ICETEX). Recursos y requerimientos de personal de alto nivel. Bogotá, 1966?
Research that attempts to study the highly qualified human resources of the country, as a function of need.

Ministerio de Educación Nacional. Bases para una politica educativa. Bogotá, 1966.
A report prepared by the Office of Educational Planning to be presented at the Fourth Meeting of the Consejo Interamericano Cultural. It presents a synthesis of the national educational structure as an important factor in the development of the country, and of the Plan Integral Educativo 1966-1978.

Ministerio de Educación Nacional. Flujo educativo en secundaria, 1958-1980. Bogotá, 1973.
A succinct report taken from the Plan General de Desarrollo de la Universidad Industrial de Santander, 1971-1975 that analyzes the status of secondary education in Colombia in terms of its structure and the characteristics of the flow of students that are part of the universities.

Ministerio de Educación Nacional. Informe resumido sobre la situación educacional de Colombia. Bogotá, 1969.
A document that summarizes the information presented by the Ministerio de Educación colombiano to the Congress; it includes a precentation of the status of Colombian education, educational policy of the government, its successes and the programs it hopes to accomplish.

Muñoz Izquierdo, Carlos. La productividad del gasto educativo como instrumento de la planificación escolar: Comparación de dos estudios realizados en Colombia. Buenos Aires, 1972.
A work that comparatively analyzes two studies: Selowsky, Marcelo The Effect of unemployment and growth on the rate of return to education: the case of Colombia, Harvard, 1968 and Schultz, Theodore P., Rates of Return to schooling in Bogotá, Rand Corporation, Santa Monica, 1968.

Costa Rica

Gutierrez Carranza, Claudio. Análisis de información sobre rendimiento académico de estudiantes. 1972.
A statistical reexamination that presents, by years of schooling according to entrance date, student retention data, the credits taken in terms of academic load, and the efficiency of students; the performance of students by generations in relation to the high schools from which they come, the areas of study undertaken and the type of scholarships received; information relative to the Centro Regional de San Ramón; and an analysis of admission examinations and comprehensive examinations.

Consejo Superior Universitario Centroamericano.(CSUCA). El sistema educativo en Costa Rica. Situación actual y perspectivas. Costa Rica, 1964.
A study that attempts to present a panorama of the Costa Rican educational system, its present state and perspectives, from the point of view of human resources.

Romero, Mario. La deserción estudiantil en la Universidad de Costa Rica. 1964.
An original work that attempts to determine the levels and tendencies of university drop-out rates, quantify its importance with respect to the University as a whole and for each of the schools according to sex and year of study, to find out the principal factors that cause the drop-out rate, and to suggest some means of eliminating or reducing the problem.

Torres Padilla, Oscar. Un estudio de utilización. Los Profesionales en Servicio Social y el mercado de trabajo. 1972.
The first work in a series on "utilization" of professionals as projected by OPLAU. It analyzes in detailed form the professional opinions of Social Service of the University of Costa Rica in relation to their professional role and social status. It tries to relate their performance with the professional formation received and suggests forms of modifying the studies of future promotions.

Torres Padilla, Oscar. Las implicaciones económicas de un modelo demográfico-educativo para Costa Rica: 1970 - 2000. 1973.
A study of statistical data and population projections so as to determine the increase in matriculation at different levels of formal schooling, and of the costs of education at these levels, year by year, between 1970-2000.

Ecuador

Ministerio de Educación Pública. Ministerio de Educación Pública. Informe a la Nación, 1969. 1968-1969.
Annual report delivered by the Ministerio de Educación Pública to the Cámaras Legislativas. It presents a synthesis of the Ecuatorian plan of education, the government's educational policy, and the distinct educational programs for different levels and sectors of the system. It evaluates national education in relations with the necessities of socio-economic development of the country.

El Salvador

McAnany, Emile G. Research and evaluation in the El Salvador project of educational reform; some preliminary research findings from the first school year, 1969. Washington, D.C., 1970.
A report that summarizes the preliminary conclusions obtained from research on an educational reform project in El Salvador at the end of the first school year, 1969.

McAnany, Emile G. et al. Televisión y reforma educativa en El Salvador. 1970.
A report that summarizes the research carried out by the educational reform of El Salvador after the first year of education by television. (Feb.-Nov.,1969)

El Salvador (cont.)

Speagle, Richard E. Reforma educativa e introducción de la televisión en El Salvador: costos, beneficios y [illegible]. 197?
An original work that analyzes costs and benefits of educational reform promoted in El Salvador, with conclusions that the author deems valid and beneficial for other countries.

Guatemala

Escobar C., Arnoldo E. Situación socio-económica de los egresados guatemaltecos. 19[illegible].
A monograph that explains the socioeconomic situation of the educated Guatemalteans, the scarcity of fiscal resources in the educational system, and the elevated costs of the private educational system.

Jamaica

Rankin, [illegible] K. Capacitación de obreros jamaiquinos en una planta [illegible]. 197?.
A monograph that explains the specialized manpower capacity for a new plant for Alumina Partners in Jamaica (ALPART). It was developed by Instituto Industrial Dunwoody. (Minneapolis, Minnesota, USA).

Mexico

Arellano [illegible], Juan José et al. Peso y estatura en escolares de primaria por niveles socio-económicos. Mexico, 1972.
An empirical study that seeks to see if there are significant differences in the weight and height of school children in the Federal District, in relation to the socio-economic class to which they belong, and to establish height and weight [illegible] for the ages studied within the area being researched.

Barkin, [illegible]. Acceso a la educación superior y beneficio que reporta a México. México, 1971.
A reexamination of population data, income distribution data and data on rates of schooling that studies the Mexican education system with the objective of evaluating its role as educational opportunity equalizer.

Del Camino, Isidoro and Muñoz Batista, Jorge. La enseñanza profesional en México en 197?. México, 1972.
A statistical analysis that quantifies and analyzes professional education at its distinct levels in Mexico.

Jimenez Lozano, Blanca et al. Factores pedagógicos, sicológicos y socioeconómicos que influyen sobre el rendimiento escolar, en lengua nacional y en aritmética y geometría, de los alumnos que asisten a las escuelas primarias oficiales del Distrito Federal. Mexico, 1972.
Research sponsored by the OAS that attempts to (1) study the level of academic proficiency of the students in primary schools in the Federal District in the following subjects - Spanish language, arithmetic and geometry in 1967. (2) determine the influence of some factors on this proficiency (3) design and apply a methodology to study these factors and (4) provide a base for pertinent administrative measures.

Muñoz Izquierdo, Carlos. Evaluación del desarrollo educativo en México (1958-1970) y factores que lo han determinado. Mexico, 1973.
A reexamination of the available data that examines the educational development experienced in Mexico from 1958 - 1970, evaluating it from the points of view of its external and internal efficiency, and of its adequacy with respect to the growth of potential demand.

Mexico (cont.)

Muñoz Izquierdo, Carlos and Lobo Oehmichen, José. Expansión escolar, mercado de trabajo y distribución del ingreso en México. Un análisis longitudinal 1960 - 1970. México, 1974.
A reexamination of statistical data that attempts to examine the quantitative relationship between graduate schooling and the labor market, and the effects generated by this relation with regard to distribution of personal income. This study complements and amplifies the information and analysis given in a previous study. (cfr. RAE [illegible])

Peru

Briones, Guillermo and Mejía Valera, José. El obrero industrial. Aspectos sociales del desarrollo económico en el Perú. Lima, 1964.
Original research that attempts to show the diverse characteristics of the workers in the manufacturing industry in Lima and Callao. Factors such as geographic origin, reasons for migration, occupational mobility, qualifications, job satisfaction, etc. are taken into consideration.

Consejo Nacional de la Universidad Peruana. Algunas características socioeconómicas de los postulantes y estudiantes de la universidad peruana. Lima, 1972.
A statistical study that analyzes the socio-economic situation of Peruvian university candidates and students in relation to a population analysis that examines the characteristics of the population (urban and rural), occupation levels, and education and income levels. It studies the growth of the university [illegible] [illegible] 1960 to 1970.

Meyer, [illegible] G. Academic Achievement, Social Background, and Occupational Recruitment: A [illegible] Study of Graduates from a Peruvian University. Chicago, 1972.
An original work that analyzes the relationship between academic perfection and occupational recruitment in a sample of graduates from the Universidad Agraria de la Molina (Peru) between 1960 and 1966.

Organisation de Coopération et de Développement Economiques (OCDE). Ressources humaines, éducation et développement économique au Pérou. Prévision des besoins [illegible] [illegible] des [illegible] de développement de l'éducation. Paris, 1967.
A report on a study of human resource planning prepared by the Instituto Nacional de Planificación (INP) of Peru, in collaboration with the OCDE: its primary objective - apart from the limits of social and economic development in Peru - is a long range forecast of Peruvian human resources (quantitative and qualitative) and a determination of the educational requirements as a base for the design of educational policy.

Puerto Rico

Carnoy, Martin. Un enfoque de sistemas para evaluar la educación, ilustrado con datos de Puerto Rico. Puerto Rico, 1971.
This paper develops a system based on cost-benefit analysis that attempts to provide a model in which one can evaluate the effects of family history, formal education and out-of-school training on the society. The model is applied to education in Puerto Rico.

Carnoy, Martin. The Rate of Return to Schooling and the Increase of Human Resources in Puerto Rico. Puerto Rico, 1972.
The rate of return on schooling is a measure of the economic incentive for individuals to acquire additional schooling. This work is a reexamination of data from the general census of the Puerto Rican population in [illegible].

República Dominicana

Kritz, Ernesto and Ramos, Joseph. La situación ocupacional en Santo Domingo y Santiago de los Caballeros: Analisis de dos encuestas experimentales de mano de obra. Santiago, 1975.
A preliminary working paper that analyses the levels of utilization and underutilization of manpower in Santo Domingo and Santiago de los Caballeros.

Venezuela

Barrios, Hildebrando. Tasa social de retorno de la educación pública. Metodología y cálculo. (zona metropolitana de Caracas, 1970) Caracas, 1975.
Document prepared by the Second Seminar on Research and Planning of the Costs of Education, by the signatory countries of the Convenio Andres Bello in July of 1973. It analyzes the cost-benefit ratio of education in the metropolitan region of Caracas in an effort to arrive at a more rational distribution of resources.

Carbo de Freaño, Rosario and Johnson Vogeler, Susan. El efecto del gasto en el rendimiento escolar: una primera aproximación. Caracas, 1972.
A work measuring the relation between teachers' salaries and scholarly proficiency of student production.

deLeón, [illegible]; de [illegible]; Piñango, Ramón; and Sánchez, Basilio. Nivel de aprendizaje de los estudiantes venezolanos de sexto grado en adición, sustracción, multiplicación y división. Caracas, 1971.
An original work that establishes a preliminary diagnosis of achievement levels in the basic mathematical operations attained by Venezuelan students who have completed primary education.

Lobo Ochsichen, José. Educación y distribución del ingreso en Venezuela; un análisis regional. [illegible], 1972.
An original work that proposes to prove by empirical means the theoretic model designed by Mincer, Becker and Chiswick (Becker, Gary and Chiswick, Barry: "Education and the Distribution of Earnings", American Economic Review, May, 1966) that relates personal distribution of earning with investment in human capital.

Ministerio de Educación. [illegible] de los educandos. Caracas, 1970.
A first report in a series of documents related to the Evaluación Nacional del Rendimiento Escolar (National Evaluation of Educational Proficiency) carried out by the Department of Educational Research.

Ministerio de Educación. Educación y adiestramiento. Caracas, 1963?
Part V of the Annual Report presented by the Venezuelan Government to the 1963 meeting of the Consejo Interamericano Económico y Social (CIES). Summarizes the most characteristic aspects of Venezuelan education to date, describing its organization, progress, and a four-year plan for development. It describes the Plan Integral de Educación as elaborated by EDUPLAN, including the national education policies, and what has been accomplished according to sectors and services.

Johnson Vogeler, Susan. Manual metodológico sobre un analisis del efecto del gasto en el rendimiento escolar. Caracas, 1975.
A work prepared by the Second Seminar on Research and Planning of the Costs of Education in the signatory countries of the Convenio Andres Bello in July, 1973. It develops a methodology that serves as a basis for studies on costs of education in these countries.

OR RESEARCH (RPO # 299)

Mr. J. Schaech, CAD

October 3, 1974

Mona Hazzah, VPD MH

Computer Expenses for FY75 - RPO 299

Please authorize $5,100 for external research project RPO 299 (charge code 670-99) for FY75.

cc: Messrs. Rathnam, CRD
P. Smith, VPD
West, CAD
Moran, ECDPH
Busz, ECDDR

V.P. Research
cc LI HIT

OCT. 2, 1974

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

INTERNATIONAL DEVELOPMENT ASSOCIATION

INTERNATIONAL FINANCE CORPORATION

ROUTING SLIP	Date Oct. 8, 1974

Name	Room No.
Mr. Stern	

	To Handle		Note and File
	Appropriate Disposition		Note and Return
	Approval		Prepare Reply
	Comment		Per Our Conversation
	Full Report		Recommendation
	Information		Signature
	Initial		Send On

Remarks

To prepare a reply for Mr. McNamara's signature.

Anders Ljungh

From

OFFICE OF THE PRESIDENT

CAMBRIDGE, MASSACHUSETTS 02139

October 2, 1974

Mr. Robert S. McNamara
President
The World Bank
1818 H Street, NW
Washington, DC 20433

Dear Bob:

I understand that Dr. Virgilio Barco spoke to you about the proposal that the World Bank join the MIT Industrial Liaison Program, or the "ILP", as we call it. In addition to Dr. Barco, our people (General Lampert and Robert Hagopian) have talked with Mr. Ernest Stern, Dr. Charles Weiss, and Mr. Jeffrey Balkind. I'd like to offer a few personal observations concerning the ILP, described in the enclosed leaflet.

A proper question is how the World Bank would gain from membership, since many of your staff members already have contacts at MIT; and why the World Bank should be asked to pay the minimum $20,000 in annual support to this Program when MIT might benefit subsequently from other programs with the Bank, such as specific research contracts and individual consulting arrangements.

Several current members of the ILP also have many contacts at MIT and nevertheless profit from membership. About 2,000 separate research projects are underway here. Because individual faculty members are unlikely to know of activities outside their own fields of interest, the ILP Liaison Officer, whose duties are described in the leaflet, has the job of insuring that the member organization is broadly informed on all research activities of interest to the member. Membership would give the World Bank good assurance that it will have effective use of the totality of information available from the Institute. The enclosed "The World Bank and MIT Research", which lists several research programs of mutual interest, documents in an

impressive way the potential in a formal liaison between our two organizations.

The additional services described in the leaflet are equally significant and valuable. For example, the symposia and seminars frequently cover subjects which we believe are of interest to the Bank, such as the enclosed "Emerging Aspects of International Monetary Problems" and "Politics and Economics of Trade with Russia and China".

The Program requires a well-qualified staff and a variety of support services. The funds needed to operate the ILP are substantial and necessitate that member companies be willing to pay for the service, irrespective of any specific research contracts or individual consulting arrangements resulting from a member's participation.

We fully expect to provide a participating member services well worth the annual fee. I hope that the World Bank will join the Program and am confident you would find it a sound investment.

With my warmest regards, I am

Sincerely yours,

Jerome B. Wiesner
President

Enclosures

THE WORLD BANK AND MIT RESEARCH

To demonstrate the relevance of ongoing MIT research programs to the current activities and interests of the World Bank, the attached preliminary tabulation was prepared. Projects listed in MIT's Directory of Current Research are shown for the major sectors contained in "World Bank Operations, Sectoral Programs and Policies", 1972. A close and comprehensive relationship appears evident for all sectors with the exception of "Tourism".

The attached listing also includes several projects under the headings "Nutrition" and "Others" which appear to be of interest to the World Bank.

February 4, 1974

WORLD BANK OPERATIONS

By Sector And

MIT RESEARCH PROJECTS

Agriculture

4.04.001 Robotics
4.22.010 Sesto San Giovanni: The Transformation of and Italian Suburb

Industry

4.10.005 Multinational Construction Firms and Transfer of Technology
4.10.037 Defining Alternative Strategies for the Sahel-Sudano
4.13.003 International Trade Theory
4.18.022 Energy Requirements for Production of Metals
4.24.001 Problems of Advanced Industrial Societies
4.24.003 Business and Political Links in Black African States
4.29.035 Guidelines for International Enterprises
4.29.036 Japanese Model of Technology Applied to Brazil
4.29.037 Barriers to Innovation in Less Developed Countries
4.29.081 Employment Effects of U.S. Investment: Brazilian Auto Industry
4.29.082 Regulation of Industrial Conflict in Brazil
4.45.014 Technological Development and International Institutions
4.51.016 Industrial Facilities Location

Transportation

4.02.017 Innovative Transportation and Environmental Design
4.10.010 Investment Strategies for Highway Construction
4.10.059 Railroad Network Evaluation
4.10.060 Railroad Service Reliability Project
4.10.061 Airport Access Case Study
4.10.064 Models of Facility Location
4.11.003 Port Design and Analysis Methodology
4.41.011 Operations Research Applied to Transportation Problems

Transportation continued

4.50.002 Urban Transportation in Developing Countries
4.50.003 Air Transportation in Developing Countries
4.50.004 Systems Analysis as an Aid in the Development Process
4.50.005 Standards for Urbanization and Housing Technologies in Kenya
4.50.008 Highway Cost Model
4.51.004 Aggregate Demand Modeling
4.51.017 Urban Goods Movement
4.51.019 Barriers to Innovation in Goods Distribution
4.55.003 Transportation Information Systems
4.55.011 Transportation and Community Values
4.55.013 Transporation Planning Research: State of Israel

Telecommunications

4.13.012 Economics of Television Broadcasting
4.13.013 Allocation of the Electromagnetic Spectrum for Land Mobile Use
4.15.018 Spectrum Management Studies for Land-Mobile Radio
4.24.017 Asian Communications, Economics and Social Change
4.24.032 Telecommunications Policy
4.44.006 Telecommunications Policy Planning
4.45.019 World Communication

Electric Power

4.10.031 Offshore Floating Nuclear Power Station
4.10.038 Requirements for Water and Electric Power in Saudi Arabia
4.16.007 Power System Modeling
4.16.008 Adaptive Modeling and Control for Electric Power Systems
4.18.004 Environmental-Economic Evaluation Models of Energy Systems
4.18.007 Economic-Environmental Tradeoffs in Power System Expansion Planning
4.18.008 Electric Generation System Scheduling and Simulation
4.18.019 High Concentration Solar Energy Collectors
4.20.002 Environmental Impact of Electrical Energy Production

Water Supply and Sewerage

4.10.025 Professional Education in Environmental Management
4.10.039 Analysis of Water Quality Monitoring Programs
4.10.040 Strategies in Water Quality Management
4.10.041 Screening Models for Water Resource Planning
4.10.042 Hydrologic Network Design
4.10.043 Estimation of Hydrologic Parameters
4.10.044 Project Evaluation: Budget Constraints
4.10.045 A Conceptual Model of Continental Water Storage Flux
4.15.036 Wastewater Treatment with High Energy Electrons
4.18.012 Cooling Water Discharge Studies
4.50.001 Technology Transfer for Water Resource Planning

Education

4.19.001 Center for Advanced Engineering Study
4.14.001 Division for Study and Research in Education
4.25.004 Educational Technology

Population Planning

4.24.005 Population Dynamics and Armed Conflict
4.24.006 Political Demography
4.24.007 Internal Migration in India
4.39.175 Fertility Control in Central Africa

Urbanization

4.02.010 Low Cost Housing and Urban Design in Developing Countries
4.02.012 Program in Industrialization of the Housing Sector
4.29.075 A Plan for Urban Renewal
4.41.008 Resource Planning in Urban Public Safety Systems
4.45.007 East African and Ghetto America Economic Development
4.51.015 Equilibrium Model of Urban Location
4.54.004 Urbanization and Unemployment in Indonesia
4.54.009 Housing Technology and the Needs of Developing Countries

Nutrition

4.24.011 International Nutrition Planning
4.24.012 Analysis of Malnutrition Causes
4.39.011 Nutrition and Behavior
4.39.013 Effects of Chronic Malnutrition on Brain Function

Nutrition continued

4.39.014	Effect of Neonatal Diet on Response to Infectious Disease
4.39.015	Nutrition and Development
4.39.065	Nutrition Evaluation of Single-Cell Protein
4.39.086	Endemic Goiter in Latin America
4.39.087	Iron Deficiency Anemian and Work Capacity in Adult Males
4.39.151	Protein Concentrate Made from Squid
4.39.152	Preparation of Canned and Dried Squid Products
4.39.167	Child Nutrition Evaluation Project
4.39.168	International Malnutrition Map
4.39.169	Nutrition, Food Processing and Import Substitution in Chile
4.39.170	Multidisciplinary Analysis of Malnutrition Casuality
4.39.171	Nutrition Planning in Indonesia
4.39.172	Nutrition Planning in Pakistan
4.39.173	Nutritional Status of Population Groups

Others

4.13.014	Latin American Financial Markets
4.13.015	Socialism as a Producers' Economy
4.15.025	Socioeconomic Systems Analysis
4.20.003	International Environmental Control: Pollution from Trace Metals
4.24.002	International Business
4.24.004	Resource Scarcity and Foreign Policy
4.24.008	Social Science Data on India
4.24.009	Psychological Bases of Asian Politics
4.24.010	African Liberation Movements
4.24.022	Social Conflict and Radicalism in Relatively Developed Democracies
4.24.027	Analysis of Global Interdependence
4.24.029	Science and International Relations
4.24.037	Forecasting in Political Analysis
4.29.005	Implications of Alternative International Payment Systems
4.29.011	Research Cooperation in the OECD
4.29.017	Brazilian Development Bank Training and Research
4.29.029	Characteristics of Effective Helping Organizations
4.29.032	Workers' Ownership and Management in Peru
4.29.033	Comparative Effectiveness of Public and Private Enterprises
4.29.068	Sharing Rules for International Joint Ventures
4.40.003	Technical Assistance on the Coastal Zone
4.50.006	Structural-Acoustic Interaction in Water

O.P. Research (289)

Form No. 27
(3-70)

INTERNATIONAL DEVELOPMENT ASSOCIATION | INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT | INTERNATIONAL FINANCE CORPORATION

OUTGOING WIRE

TO: MILIC
INSTITUT EKONOMIKU POLJOPREVREDE
POST FAH 93
BELGRADE

DATE: 10/1/74

CLASS OF SERVICE: ~~LT CABLE~~ (3696) IBA/Cont

COUNTRY: YUGOSLAVIA

TEXT:
Cable No.:

RE URLET SEPTEMBER 24 ACTION TAKEN TO RELEASE FUNDS SOON AS POSSIBLE STOP DELAY DUE TO COST OVERRUN EXCEEDING PROJECT BUDGET STOP REGRET INCONVENIENCE REGARDS

DONALDSON

Yugoslav Smallholder Study
RPO 289

NOT TO BE TRANSMITTED

AUTHORIZED BY:

NAME G.F.Donaldson

DEPT. Agriculture & Rural Development

SIGNATURE G.F. Donaldson
(SIGNATURE OF INDIVIDUAL AUTHORIZED TO APPROVE)

REFERENCE:

ORIGINAL (File Copy)

(IMPORTANT: See Secretaries Guide for preparing form)

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Checked for Dispatch:

INTERNATIONAL DEVELOPMENT ASSOCIATION

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

INTERNATIONAL FINANCE CORPORATION

DISPATCHED

COMMUNICATIONS SECTION

TO: MILIC
INSTITUT EKONOMIKU POLJOPRIVREDE
POST FAH 93
BEOGRAD

DATE: 10/1/75

CLASS OF SERVICE: (3595)

COUNTRY: YUGOSLAVIA

TEXT:
Cable No.:

RE UNIET SEPTEMBER 21 ACTION TAKEN TO RELEASE FUNDS SOON AS POSSIBLE

STOP DELAY DUE TO COST OVERRUN EXCEEDING PROJECT UNIEET STOP REGRET

INCONVENIENCE CAUSED

DONALDSON

NOT TO BE TRANSMITTED

AUTHORIZED BY:

NAME: G.F.Donaldson

DEPT.: Agriculture & Rural Development

SIGNATURE:

REFERENCE:

(IMPORTANT: See Secretaries Guide for preparing form)

ORIGINAL (File Copy)

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OP-RESEARCH
(RPØ#312)

Mr. Dhaiyashil C. Rao, Office - V.P., Development Policy
Harold R. Shipman, Water Supply Advisor, Public Utilities Department
RPØ 312 - Reduction of Waste Water from Public Hydrants

October 1, 1974

In our conversation of September 30, I agreed to give you a few figures which would clarify some of the cost aspects of the RPØ 312 project. The International Reference Center (IRC) has not given me a specific figure for the consultant's fees and I am using $150/day for the following breakdown. I have the feeling that we can reduce the total by using a lump sum agreement, and this, coupled with some possible savings in the literature search and report preparation resulting from IRC staff input, should bring the cost to around $37,500. You will note on the attached letter to IRC that I am asking them for an estimate and when we have this, coupled with the results of the search, a meaningful lump sum figure should exist for justification of any charges required.

14 countries to be visited (assume 5 days each, plus 10 days additional travel time) 80 days, $50 per diem cost		$ 4,000
Travel		$10,000
		$14,000
Consultant fee @ $150/day:		
Field	80 days	
Literature review	30 days	
Report	60 days	
	170 days	$25,500
Total		$39,500

HRShipman:cfa

OP-RESEARCH
(RPO #289)

Mr. Colin Bruce

October 1st, 1974

G.F. Donaldson

Payment of Fees and Computing Expenses - Institute of Agricultural Economics, Belgrade - Strategies for Smallholder Development: Case Study of Yugoslav Experience - RPO289.

1. Attached is a Request for Payment together with an invoice received from the Institute of Agricultural Economics, Belgrade, covering the expenses for the period February to June amounting to $2,500, as agreed, together with expenses for computing and statistical analysis to the amount of $4,152. Since our collaboration with the Institute was completed at the end of June, they are anxious that this amount be paid as soon as possible.

2. The amount of $2,500 for Institute services is as agreed and covered in the original budget for the study. The amount of $4,152 for computing and statistical analysis exceeds the amount included in the budget by approximately $1,652. The additional amount was incurred during the last two weeks of our work in Belgrade when we found that none of the data which we had collected could be taken from the country. Accordingly, it became necessary to complete the statistical analysis using the computing services available to the Institute. Though these services were somewhat more expensive than they might have been had we done the analysis in Washington, it was an essential cost if the project was to be completed as we had outlined in the detailed study designs of February 1974.

3. A sum of $5,500 is available in accruals on the FY74 budget. If this is applied to the Institute account, then $1,152 remains to be paid from the FY75 budget. Payment of this account in full will bring total disbursements on this project to approximately $29,000 which is still $6,500 less than the total budget originally submitted, of $35,500.

4. The Institute's participation in this project was completed in excess of the original arrangements we had made with them and their contribution was substantial. The quality of the data obtained was far better than we had expected and will facilitate an early completion of the study. In view of this, I recommend that this account be paid as soon as is possible.

cc: D.C. Rao
G.F. Darnell

GFDonaldson/mt

Form No. 168 (11-71) INTERNATIONAL DEVELOPMENT ASSOCIATION | INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT | INTERNATIONAL FINANCE CORPORATION

REQUEST FOR PAYMENT FOR PROFESSIONAL SERVICES

To: ADMINISTRATIVE EXPENSE DIVISION

From: The Director, Institute for Agricultural Economics
(Name of Consultant)

Supervising Dept.: Agriculture & Rural Development

Date: October 1st, 197[illegible]

PROFESSIONAL FEES FOR PERIOD *Give the exact dates of the period, or days, for which fee is being claimed, and if fee is at a daily rate, indicate the number of days claimed each month in the column provided.*			At Agreed Rate Of	Per	Amount
From	To	Number of Days Claimed			
February, 197[illegible]	June 197[illegible]		$500	Month	$2,500
Computing services, statistical analysis as per invoice of July 11, 197[illegible].					$[illegible],152
Total					[illegible],652

CERTIFICATION

I certify that I devoted full time to the assignment with the Bank/Corporation during the above stated period(s), and that I have not received and will not claim reimbursement for this assignment from any other source.

I request that payment be made to me as follows:

[x] Mail check to my order to the following address:

[ ] Deposit check to my account with:

The Director,
Institute for Agricultural Economics,
Kneza Milosa 26/11 - Post. fah 93,
Belgrade, Yugoslavia.

Name of Bank: _____
Account Number: _____
Address: _____

NOTE TO CONSULTANT: Please be sure that your Statement of Expenses, Form No. 8, has been submitted and that all travel advances made to you by the organizations have been settled. Payment of fee may be delayed if advances have not been settled.

Date: October 1st, 197[illegible].	Signature of Consultant:
Date:	Approved:

INSTITUTE FOR AGRICULTURAL ECONOMICS
INSTITUT ZA EKONOMIKU POLJOPRIVREDE
Kneza Miloša 26/II — Pošt. fah 93
Beograd — Yugoslavia, July 11, 1974

Mr. Graham Donaldson
International Bank for Reconstruction and Development
Rural Development Division, Central Project Staffs
1818 H. Street, N.W., Washington, D.C. 20433

I N V O I C E

Computer model: ICL 4-50
Time is counted as central processing unit + peripheral time (up time)

Item	U.S. $	¢
1. Institute services	2,500	
2. Computer programming and sorting of 10.313 holdings for regression and linear programming analysis	2.078	19
2.1. Programming	738	19
2.1.1. Programming for the sort program	394	22
2.1.2. Programming for l.p. variables	343	97
2.2. Computer use	1.340	
2.2.1. Random sorts - every 40th and every 35th holding (45 minutes)	180	
2.2.2. Time spent testing (150 minutes)	600	
2.2.3. The actual sort of 10.313 holdings (140 minutes)	560	
3. Regression analysis of 10.313 holdings	2073	37
3.1. Programming of control cards for regression package	461	37
3.2. Computer use	1.612	
3.2.1. Time spent testing (35 minutes)	140	
3.2.2. Correlation matrices and other statistics - complete print outs (116 minutes)	464	
3.2.3. Final runs for all equations on selected cells of more than 30 observations (252 minutes)	1.008	
ITEMS 1, 2 AND 3 TOTAL AMOUNT	6.31	56

INTERNATIONAL DEVELOPMENT ASSOCIATION | INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT | INTERNATIONAL FINANCE CORPORATION

OF RESEARCH (DETERMINANTS OF SCHOOLING IN N.E. BRAZIL)

OFFICE MEMORANDUM

TO: Mr. D. C. Rao

DATE: October 1, 1974

FROM: T. King

SUBJECT: "The Determinants of Schooling in Northeast Brazil": Comments on J. P. Jallade's research project proposal submitted for my signature on September 27, 1974

1. This Division is strongly interested in fostering research on the topic by the title of this proposal. We are familiar with the ECIEL proposal for Research on Education and believe the program does offer prospects of yielding valuable results. We do however have major reservations about the present form of this proposal. These concern, mainly:

a) sources of data to be utilized,
b) cost effectiveness considerations and
c) institutional arrangements.

2. Sources of data. The proposal mentions 3 specific sources of household data to be utilized; to wit: "...those carried out by ECIEL, IBGE and SUDENE." It is our understanding that the data from the IBGE household surveys (presumably, those carried out by PNAD), are not generally available in "user tape" form that would allow for the type of multivariate statistical analysis envisaged in the proposal. Unless some special and exceptional arrangements can be secured with IBGE to make such tapes available to this particular study, this source of data will not be particularly useful for the proposed analysis. The pilot survey for RPO 299 is weak on budget data; this should be improved in the SUDENE-IBRD 2000 rural household survey but this data will not be available for analysis until well into 1976. We have already had an enquiry from ECIEL about the possibility of collaboration on the design of education questions for RPO 299, which we would welcome; but it appears that this proposal is quite a separate one. Finally, the fact that the data from the ECIEL survey of "between 700 and 800 households..." undertaken in the city of Recife some five years ago is still in the data cleaning phase (p. 4), raises some doubts as to the quality of the original data, the efficiency of the contractor proposed for this project, or both. Greater assurance of data availability should be ascertained.

3. Cost effectiveness considerations. As we read it, the proposed research seeks to investigate the degree of association between a series of factors and two dependent variables (i.e., (a) the number of years of schooling received by an individual and(b) the private direct cost to the student or his family to obtain such schooling), through single equation regression models, utilizing data already collected. $96,000 seems rather a lot for this. Presumably, the individual researchers will carry this analysis to greater depth, but it is hard to justify the size of this request without knowing who they will be or the nature of the individual work they may wish to do.

4. Institutional arrangement. This proposal would contract a piece of research to CIEL, which would in turn sub-contract it out to a third entity. In general, this sort of arrangement tends to weaken Bank staff involvement and control over the project. In this particular case, this appears even more likely since: a) only two Bank-staff-months have been budgeted for the entire duration of the project and b) the sub-contractor who would ultimately undertake the research is wholly unspecified.

TKing:jln

cc: Mr. Ballantine
Mr. Jallade
Mr. Moran

O.P. Research (321)

Mr. F. Lowenstein, AEPIR

October 1, 1974

Ernest Stern, VPP

Foodgrain Production in Asia (RPO 321)

1. This is to inform you that you may proceed with the research project, in accordance with the program attached to the memorandum from Messrs. Yudelman, Picciotto and Powell, dated September 24, as clarified by your memorandum of September 25 to Messrs. B. King and D. C. Rao.

2. The financial allocation for FY75, as approved by the Research Committee on July 29, is $50,000. Your request in the abovementioned proposal is for $70,000. Could you consider further, the possibility of trimming the budget to the originally approved sum of $50,000. If this is not possible, the question will have to go to the Research Committee, which is expected to meet in late October.

3. The RPO number for this project is 321. Please ensure that you use this number on all documents relating to this project and in the subject identification of memoranda.

4. A quarterly status report will be due for this project in January 1975 and every quarter thereafter, until the completion of the project.

cc: Messrs. D. D. Brown, Egbert, Bruce, Yudelman, Picciotto, Vergin, B. King/D. C. Rao

DCRao:gm

O.P. Research
(R.P.O 312)

Mr. H. R. Shipman, PBP

October 1, 1974

D. C. Rao, VPD

Reduction of Waste Water from
Public Hydrants (RPO 312)

This is to confirm our discussion of your memorandum of September 25 to Mr. Stern.

It is not possible to approve the additional $7,500 for this research project until we have

(a) a breakdown of the proposed total expenditures of $37,500, showing travel, consultant fees, data processing and other expenses separately;

(b) a better indication of the number of countries in which the field work is to be undertaken.

Nevertheless, it would be undesirable to postpone the start of this research project longer than necessary. It would be desirable if you could arrange with the International Reference Center to get the literature search under way, while the remaining issues are sorted out.

cc: Messrs. Stern
B. King
Miss Peter

DCRao:gm