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Report of the World Bank Advisory Panel on Commodities

May 1979

PREFACE

The members of the Panel were:

Dr. Ali Ahmad Attiga	Secretary General Organization of Arab Petroleum Exporting Countries, Kuwait
Professor Alan Brown	University of Oxford England
Dr. Eric M. Ojala	Senior Research Fellow Massey University Palmerston North, New Zealand
Dr. Affonso Celso Pastore	Minister of Finance, State of São Paulo, Brazil

The Panel met at Bank headquarters, July 10-14, 1978. After this session Dr. Attiga was obliged to withdraw from the Panel owing to the pressure of his responsibilities, but he contributed written observations and suggestions which are attached as Annex 3.

A second session of the Panel was convened at Bank headquarters in March 1979, but in the event Dr. Pastore was unable to attend because of the demands of his new Cabinet responsibilities. Thus, Dr. Attiga and Dr. Pastore did not attend any meetings of the Panel after the first; however, Dr. Ojala visited Kuwait and São Paulo to consult with them. Professor Brown and Dr. Ojala worked at the Bank from March 5-9, 1979.

The Panel members wish to express their thanks to Dr. Leonard L. Fischman, Consultant on Mineral Commodities, for his valuable comments on early drafts of the report. Members of the Panel also greatly appreciated the cooperation extended to them by the many Bank staff whom they consulted.

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I. INTRODUCTION AND SUMMARY

1. Terms of Reference

The terms of reference given to the Panel had three main aspects. The primary purpose indicated was "to evaluate the quality and effectiveness of the economic support given to the World Bank's operations and country economic analysis in primary commodity trends." This evaluation was to include: "an assessment of the overall approach to primary product/price/volume medium-term forecasting"; and "a review of the appropriateness of the dissemination of the results to member countries."

This aspect of the terms of reference brings into consideration all Bank work relating to primary commodities, wherever located. Some of this work entails research.

The other two aspects specified in the terms of reference relate only to research. The Panel was required to review the research undertaken and sponsored by the Bank in the area of primary commodities in relation to the Bank's research objectives. The Panel was then to make recommendations to the management of the Bank regarding research priorities for the next five years. In considering these aspects of its terms of reference, the Panel decided that it could not take a purist view of research, but should take into account all analytical studies, as well as the data base upon which the support to the operating units is built.

Since many of the Bank staff who provide support in the area of primary commodities also give attention to current and short-term market reviews, the Panel did not exclude this latter type of work from consideration.

This report is thus concerned in principle with evaluating the whole range of the World Bank's economic analysis and research on primary commodity issues, and submitting recommendations.

2. Summary of Conclusions and Recommendations

(i) Commodity work in the Bank is conducted by many units, serving different objectives in different environments.

(ii) For operational purposes, the most decisive work is that done in central and regional project and program units, at project and country levels, in connection with project appraisals and balance of payments assessments respectively.

(iii) A large degree of uniform discipline for this operational commodity analysis is provided by the Commodities Division's output of global commodity forecasts and through--to a lesser extent--individual commodity studies.

(iv) The central commodity forecasts, for which the operational staff contribute data, are competently and efficiently prepared, mainly by conventional market judgements, assisted to a small but growing extent by relatively simple commodity models developed by the Commodities Division's own staff. The forecasting methods used compare favorably with those in use for comparable purposes in other organizations.

(v) The Panel accepts the advantages of one central location for global commodity forecasting services in the Bank, while recognizing the need for a continued inflow of specialized commodity knowledge from certain central and regional units, especially as regards fertilizers, metals, minerals and energy.

(vi) There are some problems of consistency in the adaptation by the operating staff of the central forecasts of international prices to the equivalent prices to be used at project and country levels. These problems should be largely resolved by the ongoing preparation, jointly by commodity and operational staff, of a Manual on the Use of Price Forecasts.

(vii) Continuous improvement of the commodity forecasting should be based more on acquiring a deeper understanding of markets and their functioning than on further sophistication of formal modelling. The models being developed and improved by the Commodities Division should continue to be exposed periodically to review by commodity and modelling specialists outside the Bank, with a focus on improving the forecasts rather than the models alone.

(viii) Long-term forecasts (five to ten years), however rationally based at the time of forecasting, are bound to be upset by subsequent unforeseeable events. Nevertheless, the reliability of the Bank's commodity forecasts should be continuously and routinely monitored to assess ranges of accuracy and to identify the most cost-effective ways in which to seek feasible improvements in reliability.

(ix) Short-term commodity forecasting (up to two years) is required by both the Bank and the IMF. Since present arrangements for this work do not seem to be satisfactory, it is suggested that the management of the Bank might examine at an appropriate time, with the management of the IMF, the possibility of establishing a joint service in this area.

(x) The Commodities Division cannot, without a very considerable expansion of staff, give effective assistance to all country and project staff who need market prospect information for specific types of products as potential exports from specific countries to specific market areas. It would be most cost-effective to purchase such information, when required, from outside sources, such as the UNCTAD/GATT Trade Centre.

(xi) The full potential of the commodity data bank of the Commodities Division as a source of information for operating staff should be realized as rapidly as possible. Historical and current series on production, trade and prices should be added for commodities for which forecasting is not considered worthwhile, including selected processed products not already covered, and for selected representative types of project inputs. Computerization should be extended and terminals installed throughout the Bank, so that one single set of consistent data in the system can be readily accessed directly.

(xii) Since there is currently no comprehensive source of consistent international data on metallic and mineral commodities, it is recommended that the Bank request that the United Nations develop such a system of data as soon as practicable. If such a request cannot be met, the Bank should consider undertaking this task itself.

(xiii) It would be highly desirable if the commodity and country information assembled by operating units could be assimilated into the central data base--methods for achieving this on a continuing basis should be explored as a matter of urgency.

(xiv) The commodity research initiated under Research Committee auspices, though highly professional and sophisticated, has not yet made any significant contribution to the operational and policy roles of the Bank, and the direction of the work still underway is hardly more promising in this respect. However, the results of the commodity modelling to date under RPO 671-09 "Natural Resources and Planning" should be examined by central and operational staff to develop the potential applications to Bank forecasting and development policy analysis.

(xv) The Commodities Division should ensure servicing of all relevant Bank units with current market reports issued by the authoritative commodity bodies outside the Bank, without attempting to duplicate their work, but drawing attention to developments significant to the Bank.

(xvi) With some promising exceptions, the Bank's in-depth studies of individual commodities and commodity groups tend to focus too exclusively on overall market factors and global supply, demand and prices, and thus do not yet display the world development orientation appropriate to the Bank's status and role as a major international lender for commodity production.

(xvii) To promote the coherence and operational/policy value of the whole range of commodity services and research in the Bank, it is recommended that an in-house commodities steering group be established.

(xviii) Comparative advantages, requirements and opportunities in the Bank point to the following evolution of its commodity work:

(a) the assembly and systematization of the Bank's own operation-derived data on commodity production and processing, including productivity, costs, competition, and trends, with a view to making them available for manipulation and use; and

(b) utilization of such data, along with conventional international data

- to improve commodity projection and forecasting work, especially on the production side;

- to start a new generation of Bank commodity studies that concentrate, not on current market reviews, but on longer term factors and development issues relevant to

  . commodity lending policy thinking in the Bank; and

  . international commodity policy, including Bank advice to international commodity bodies, as already provided for by Executive Board decisions.

(xix) In addition to continuing improvement and better operational and policy orientation of commodity work, four research projects are recommended:

(a) the linking of cyclical and trend elements in forecasting the behavior of commodity markets;

(b) the treatment of inflation in price forecasting;

(c) the study of comparative costs and productivity in production of selected agricultural and mineral commodities, starting from available Bank information and research projects, with a view to feeding into Bank commodity policy and international commodity policy; and

(d) the study of factors affecting the location of processing of selected agricultural and mineral commodities, with a view to orienting Bank and international development policies.

(xx) It is estimated that the above research projects, which should be monitored by the proposed Bank commodity steering group, would require one additional staff research coordinator in the Commodities Division, plus some $70,000 of external funds per year for five years.

(xxi) It is recommended that the proposed commodity steering group, or a similar representative group, should develop a more coherent and open system of publication for the Bank's output in the commodity field.

II. COMMODITY WORK AND OUTPUT IN THE BANK

3. Location of Commodity Work

Analytical studies and research with a commodity component are commonly carried out at the following locations in the Bank:

- Commodities and Export Projections Division;
- Other Development Policy units, including
  - . other Divisions of the Economic Analysis and Projections Department
  - . Policy Planning and Program Review Department
  - . Development Economics Department
  - . Development Research Center
- Agriculture and Rural Development Department;
- Industrial Projects Department;
- Energy, Water and Telecommunications Department;
- Regional Departments.

(a) Commodities and Export Projections Division

The specialist commodity staff of the Bank are concentrated in this Division of the Economic Analysis and Projections Department. 1/ The principal role of the Division--with the collaboration of other units--is to develop and disseminate short-term (up to two years), medium-term (three to five years), and long-term forecasts (up to 15 years) of export prices and global export volumes for main agricultural commodities, metals and minerals, including petroleum and fertilizers. 2/ For some commodities, especially non-agricultural and fertilizers, essential data and analyses are contributed by more specialized units of the Bank, as indicated below.

These long-term forecasts are used by the Projects Departments in assessing the commodity production loans of the Bank; and the short- and medium-term forecasts by the Programs Departments in assessing the

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1/ The Division has a staff of 15 professional and 15 non-professional officers. This compares with 50 professional and 50 non-professional staff in the Commodities and Trade Division of FAO, and 48 professional staff (plus non-professionals) in the Commodities Division of UNCTAD.

2/ Analytical work is focussed mainly on the medium- and long-term. An informal understanding with the IMF recognizes the role of the Fund's research staff in sort-term projections.

value of merchandise exports and balance of payments prospects of individual member countries and hence their creditworthiness and eligibility for regular or IDA financing. The forecasts are also used in the global model and the country models underlying the preparation of the Bank's World Development Report.

A principal output of the Division is its annual report on Price Prospects for Major Primary Commodities, issued in June. The 1978 report (814/78) contains, for each of 15 agricultural commodities or commodity groups, plus fertilizers, and for 8 metals and minerals (plus petroleum), historical and current data on world prices and export volumes, and annual price and export volume forecasts up to the year 1990, together with a brief market analysis and methodological note for each commodity covered. Revisions of the price forecasts are undertaken and disseminated as necessary.

The staff of the Commodities Division maintain an ongoing awareness of developments in the commodity situation through the assembly of current information from trade literature, other organizations and personal contacts, and provide briefing for Bank management and project or sector missions as required.

As a by-product of the computerized data base built up to serve its forecasting function, the Division distributes within the Bank, and outside on request, a monthly printout of computerized data on current commodity prices. For general reference, an annual summary of historical statistics of Commodity Trade and Price Trends (e.g., Report No. EC 166/78) is issued.

The chief sources for information stored in the commodity data bank are FAO, UN, UNCTAD, Metallgesellschaft A.G., US Department of Agriculture and US Bureau of Mines. The range of commodities covered by the data files greatly exceeds those routinely monitored by the Commodities Division. The system can respond quickly to requests for basic commodity data and provides a basis for analytical studies which require standardized data for many commodities and countries.

Many such studies are produced by the Division, to serve a variety of purposes. Some are designed to enlarge, for a particular commodity, the brief explanatory reference given in the annual report on price prospects. They provide for Bank staff an analysis, in greater depth, of demand, supply and/or other factors affecting the market and the market prospects of the commodity or commodity group in question.

Other studies are internal policy papers prepared specifically for the Bank's Executive Board, for the purpose of eliciting or orienting an operational policy decision by the Bank with respect to commodity lending, or simply as background information for the Board. Other reports again deal with general questions or problems in the international commodity field, for the information of Bank staff and/or for general circulation.

An important continuing activity of the Division is research aimed at the improvement of methodology in operational price forecasting and in commodity analysis generally. Currently the Division is not undertaking any research funded by the Bank's Research Committee. However, it does engage in methodological research out of its own budget.

(b) Other Development Policy Units

Other units within the Development Policy Staff may undertake studies of special aspects of commodity markets, e.g., economic rent in metals and minerals (Economic Analysis and Projections Department); or development issues emerging from commodity analysis, e.g., a perspective on the foodgrain situation in the poorest countries (Policy Planning and Program Review Department 1/), food security (Development Economics Department) and a study of the weakest commodities produced by the poorest regions (Development Economics Department).

Most of the commodity-related research in these units is funded through Research Committee allocations. Some is contracted to outside institutions. Much of it is not geared to current operational requirements, although some research in the Economic Analysis and Projections Department funded through the Committee is designed to develop methodologies for linking commodity forecasting with macroeconomic analysis for purposes of the Bank's world development reporting.

(c) Agriculture and Rural Development Department

The main focus of this Department--as of other central projects staff--is on projects in particular countries. It is a major user of the world price forecasts for agricultural commodities, from which it derives prices appropriate to the country and project level, further differentiated by type and grade of commodity produced and transport costs. This adaptation is often assisted by the engagement of consultants in the context of project appraisals, to assess market prospects for the specific commodities to be produced in the particular project. Such commodity studies may be attached as market annexes to the projects as submitted for approval.

Long-term market analysis is done for a few commodities not covered in the annual price prospects report of the Commodities Division, e.g., dairy products. The staff have recently prepared a major development policy study on tropical root crops. This unit also prepared sector policy papers, e.g., on forestry and fisheries, designed to influence the content and orientation of project proposals and of Bank lending in the particular sector.

1/ Jointly with the Agriculture and Rural Development Department.

(d) Industrial Projects Department

Staff of this Department contribute to and utilize the long-term price forecasts disseminated in the annual Bank report, and make the necessary adaptations to specific project level. Consultants are often used to undertake market and price analyses in connection with important loan projects, and a market annex is prepared and attached to each project submitted for approval. For project purposes, market analyses are kept up internally for cement, steel and pulp and paper.

The Department has a Research Unit on fertilizers, which maintains an overview of the world fertilizer situation and short- and long-term prospects, in collaboration with UNIDO and FAO through the UNIDO/FAO/World Bank Fertilizer Working Group.

The specialist staff of the Department contribute basic material to the Commodities Division for use in the preparation of the short- and long-term forecasts for fertilizers and a number of mineral commodities, including copper, nickel, iron ore, steel and coal.

(e) Energy, Water and Telecommunications Department

In connection with its operating requirements, the Energy and Fuels wing of this Department maintains analytical studies on energy supplies and forecasts for developing countries and contributes these data to the Commodities Division for its work on energy. A more detailed discussion of the activity of the Energy wing is available in the Report of the External Research Panel on Energy, Water and Telecommunications.

(f) Regional Departments

Regional economists dealing with countries that depend heavily on exports of particular agricultural or mineral commodities have to acquire a fairly detailed knowledge of the world markets for those commodities in order to handle their operational responsibilities. This is especially so when the country's or region's exports are a large proportion of world exports of a commodity. Instances are Ghana for cocoa, Jamaica for bauxite, Chile and Zambia for copper, Morocco for phosphates, Brazil for coffee, Saudi Arabia for petroleum, and South Asia for rice and jute.

Such staff engage in short-term price and output forecasting for the commodities concerned. They develop an expert point of view in interpreting and using the forecasts of the Commodities Division and can make an important contribution of data to the central commodity analysis, especially on the supply side.

Staff of regional departments also undertake commodity-oriented studies at the national level, in connection with sector economic reviews or project development. Some such studies are prepared by specialists of the Commodities Division, seconded to participate in project or country missions. Such studies are occasionally distributed as Bank documents, e.g., a South Asian report on the world jute economy, but are more commonly annexed to project and country mission reports.

(g) Overall Consistency

With so many staff concerned with commodity data and their uses in so many different units, the problem of ensuring consistency is ever-present.

The purpose of the centralized commodity forecasts distributed by the Commodities Division is to provide all the Bank staff with the basis for a uniform view of the prospects for internationally traded commodities. This means that all balance of payments assessments and loan proposals for expanding the production and export of any commodity in any region of the world can be tested against the same set of market forecasts. In the absence of such a global view of commodity prices, the Bank could not function convincingly as a world development agency.

It is recognized that the kinds of commodity analyses and market studies that have to do with project evaluation and country program and balance of payment assessments in the substantive work of the Bank are the responsibility of project or regional staff, since generalized forecasts and generalized commodity knowledge cannot substitute for the specific knowledge acquired and needed at country and project levels. To promote two-way exchanges between commodity and other economists, a formal review process takes place in the early stages (April) of the preparation of the annual central commodity forecasts.

Inconsistencies are most likely in the adaptation of global forecasts to local conditions and in the evaluation of short-term market behavior. In the case of conflicting forecasts, the onus has been placed administratively on the project or country analyst to specify how his estimates are reconcilable with the globally-oriented forecasts of the commodity specialist on the basis of differences in detailed commodity specifications, transport costs, marketing arrangements or other such factors.

4. Research Committee Projects

Since its inception in 1971, the central research program of the Bank, which is administered by the Research Committee has allocated a total of some $350,000 to projects which can be said to be commodity-related. This sum amounts to three percent of the Research Committee's total allocations to date.

This is not a large proportion. It should be related, however, to the fact that the Commodities and Export Projections Division, which carries out much of the commodity analysis and research, is fully funded by the regular budget of the Bank. Operational studies with a commodity character conducted by the central projects staff and the regional staff, as described above, are also done by regular Bank staff or else by consultants engaged under project budgets.

The average annual expenditure by the Research Committee on commodity-related projects has amounted to about $50,000, exclusive of World Bank staff time. Quantitatively, the central research activities have so far been marginal to the Bank's work on commodities.

The Research Committee's allocations in this field since 1971 are summarized below:

Started in	Title	Allocation $	Originator	Completion
1972 Nov.	Prospects for Jute and Competition from Synthetics	15,000	EPDCE /1	Jan. 1974
1973 July	Comparative Analysis of Resource Allocation in Cocoa Production	22,000	EPDCE /1	July 1974
1973 Oct.	Oxford Seminar on Inflation and Commodity Prices	4,500	EPDCE /1	Oct. 1973
1974	Natural Resources and Planning - Issues in Trade & Investment	165,000	DRC, DED /2	to be determined
1975 Feb.	Agricultural Commodity Projections	50,000	EPD /3	
1975 July	Project Link	100,000	EPD /3	
1976 Dec.	Simulations of Buffer Stocks of Foodgrains	38,000	DED /2	Dec. 1978

/1 Commodities Division.
/2 Development Research Center and Development Economics Department.
/3 Economic Analysis and Projections Department.

The Commodities Division has been modest in its claims for central research funds. It has not initiated any proposals since 1973, although it has been involved in the supervision of the Agricultural Commodity Projections and Link projects. No Research Committee funds have been allocated to operating units for commodity research. Most of the commodity-related research of the Development Economics Department and the Development Research Center in recent years, as referred to above, has been based on Research Committee allocations.

All the projects originated in 1974 and subsequently have had a strong component of model-building methodology. Three of the projects--on Cocoa, Projections and Link, and parts of the one on Natural Resources--were contracted out to universities.

5. Types of Research Output

A listing of the main titles produced on commodity-related subjects in all parts of the Bank over the last few years is shown in Annex 1. These titles exclude the commodity and market annexes to sector reports and project proposals, as well as the internal analyses of operating units. Such output probably provides the most decisive analytical support to actual Bank operations.

The following categories of documents have been distinguished:

(a) Commodity Trends and Forecasts

This is the smallest category but contains the most significant item--the annual report on Price Prospects for Major Primary Commodities.

(b) Commodity Modelling/Methodology Studies 1/

In order to expose the working models being developed by the Commodities Division to experts both inside and outside the Bank, three volumes of workshop discussion drafts on the World Bank Commodity Models have been prepared and circulated. There are also separate papers describing the models being developed for various individual commodities.

A considerable number of modelling studies have emerged from some of the Research Committee-financed projects, especially those on Natural Resources and Planning and on Agricultural Commodity Projections.

(c) Individual Commodity Studies 2/

These constitute the largest output group. Such studies mostly describe or update the individual commodity market situation, usually with a current or short-term focus, although a few are concerned with projections, market structure or development.

Most of the documents in this group were prepared by the Commodities Division, but important papers have come forward from the Industrial Projects Department on fertilizers, from the Energy Division on energy supply, from the Agriculture and Rural Development Department and from Regional Departments.

(d) Papers on Bank Lending Policy for Commodities

This output 3/ consists of internal policy papers prepared for

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1/ See Annex 1 B.

2/ See Annex 1 C.

3/ See Annex 1 D.

submission to the Executive Directors of the Bank. On some subjects the papers are intended to provide a basis for discussion and decision. In other cases, the purpose is simply to inform the Board so that it has a background of information against which to assess policy issues and loan proposals.

Market impact was not a major factor in the appraisal of projects when the Bank's commodity loans were few and small. But from the 1970s the relevant project appraisal reports carried a "market annex" outlining the staff's assessment of the market prospects for the commodity in question and the probable impact of Bank lending on the world market.

In 1972 a practice was introduced of submitting to the Executive Directors a yearly review of the market prospects for particular commodities. This review was to consider the probable impact of projected Bank Group lending over the next two or three years, including the incremental output from projects previously financed. In this way the Bank moved into the phase of "commodity lending policy"--a phase which, despite some important initiatives, has so far been rather weakly developed. Not many such reviews have been put to the Board.

Some of the commodity policy papers prepared for the Board have not been concerned with market factors, but rather with changing the focus of Bank lending, as in the case of the important papers on the fertilizer requirements of developing countries, minerals and energy in developing countries, and the forestry sector.

(e) General Papers on Commodity Policies and Problems

This category comprises studies and documents dealing not with individual commodities or countries, but rather with general questions and problems in the international commodity field. 1/ Such output draws upon the individual commodity analyses and forecasts of the Bank staff to discuss and illuminate general commodity issues.

Those papers dealing with policy subjects closest to the commodity area, such as commodity agreements and price stabilization, are prepared by staff of the Commodities Division. Commodity policy studies oriented toward general development issues have originated from staff in other parts of the Bank, particularly in the Development Economics Department, the Policy Planning and Program Review Department and the Agriculture and Rural Development Department.

1/ See Annex 1 E.

6. Dissemination of Commodity Documents

(a) To Operational and Policy Users in the Bank

The output most specifically designed to be of use to operational staff--the annual report on "Price Prospects for Major Primary Commodities"--has been disseminated as a printed "document of the World Bank," with a restricted distribution and for official use only.

It is readily available to all operational users in the Bank. The Panel believes that on the whole the output is widely appreciated and widely used by Bank staff, subject to the qualifications mentioned in the next section. The decision has recently been taken to make the annual Price Prospects report a declassified publication.

The commodity policy papers prepared for top management or the Executive Directors are disseminated internally as restricted papers. Even after the policy decisions have been taken, the policies as determined do not seem to gain wider distribution in any formal way.

The other types of commodity studies are widely disseminated in the Bank and are therefore adequately available for use. Because they do not often originate from requests from operational staff, their assimilation will therefore depend on whether staff have a felt need for the information at the time it comes to hand or soon afterwards.

(b) To Research Colleagues Inside and Outside the Bank

This purpose is served by the circulation of preliminary drafts, informal notes or staff working papers. The comments received contribute to the preparation of more definitive texts, which may qualify for more formal methods of dissemination.

(c) To Governments, International Bodies and Technical and Academic Institutions

Disseminated to this group are World Bank Documents, World Bank Staff Commodity Papers or World Bank Staff Working Papers. Member governments of the Bank automatically receive copies of such papers through their Washington representatives, but it is unlikely that the documents move into the hands of all potential users in those governments, especially in the developing countries.

Distribution to international technical and academic institutions is usually at the initiative of the producing unit, which has a selective list. For the most part the lists are too small.

Such institutions and the interested public may obtain such documents on request if they are included in the World Bank Catalog of Publications free list. Thirteen of the 60 papers listed in Annex 1 are referred to in the 1978 issue of the Catalog.

(d) To the General Public

Access of the general public to the analytical studies and research done in the Bank is limited to those papers included in the World Bank Catalog of Publications, under the free list or as publications for sale. Only three commodity studies are as yet listed as publications for sale. These enjoy the commercial promotion efforts of the publisher.

(e) General Comments

It is evident that the dissemination of commodity documentation is an unsolved problem. The impact of the Bank's commodity analysis and research in the outside world, including member governments, is much more limited than is warranted by the quality of the work. Moreover, there is no easy way to discover the full range of the Bank's output in this field.

The Commodities Division has made progress in clarifying its own policy by establishing a Commodity Note series for papers of a preliminary or exploratory nature, and a Staff Commodity Paper series for documents in more finished form.

This framework does not bring any order to the identification or dissemination of commodity-related papers prepared in other units. Those that pass the draft stage are distributed as Staff Working Papers, whether designated for circulation only inside the Bank, or to outside institutions and the public as well.

As a guide to dissemination policy, it would seem desirable to establish the main purpose to be served by each paper. If the aim is to inform Bank staff and seek reactions from them, restricted internal circulation would appear appropriate. Where the objective is to influence governments and inform public opinion or contribute to international debate, a much more open and extensive system of distribution is called for including commercial publication on a more liberal scale. Also, much more coherence would be attained if the organization of Commodity Notes and Papers could be applied to all commodity-related documents, wherever prepared in the Bank.

An important method of dissemination for some purposes is the workshop or seminar, usually based on a preliminary draft text. This method is useful for obtaining the reactions of a wide range of participants, with a view to the preparation of a more definitive piece of analysis or research. National or regional seminars based on an accepted Bank position paper could in some instances be a useful way of dissemination to the appropriate government circles.

III. PANEL'S EVALUATION OF WORLD BANK'S ANALYSIS AND RESEARCH ON COMMODITIES

7. Objectives

The Panel was informed that the overall objectives of Bank research were defined as follows:

- to support all aspects of Bank operations, including the assessment of development progress in member countries;
- to broaden understanding of the development process;
- to improve the Bank's capacity to give policy advice to its members;
- to assist in developing indigenous research capacity in member countries.

Although the above objectives are specified in relation to research, the Panel has used them as points of reference when considering the whole range of commodity work.

Since the Bank's commodity work is predominantly a regular staff function, it seems appropriate to give most weight when evaluating this work to the first and third objectives, namely supporting Bank operations and improving the Bank's capacity to give policy advice to its members. However, all of the above general objectives are relevant for assessing the Bank's economic analysis and research in the commodity field, especially when account is taken of the centrally funded research projects.

Before examining the commodity work in relation to the objectives, the Panel presents its comments and recommendations regarding the technical aspects of this work.

Evaluation by an outside Panel has to be based on the circulated documents, supplemented by a limited amount of information obtained from personal interviews with Bank staff. The crucial internal commodity analyses undertaken by operational staff and consultants at project and country level, based on Bank and non-Bank sources of data, could not be evaluated by the Panel.

8. Technical Aspects of Bank's Commodity Work

(a) The Data Base

For agricultural commodities and forest products, the Bank's data base is probably the best that can be assembled at present. The co-operative arrangement established with FAO feeds in the historical and current statistical series of that Organization on production, area harvested, exports and imports (both volume and value) of all agricultural commodities and forest products for all countries, the series having already been checked in FAO for internal consistency. Yields where relevant, as well as export and import unit values, can easily be derived from the basic FAO data. Basic data are also obtained from specialized international commodity bodies and the US Department of Agriculture.

For minerals and metals there is no clearly authoritative international source. The Bank draws statistical material from many agencies and has great difficulty in trying to establish a usable set of comprehensive data, consistent as far as possible internally and capable of being fed with current data from the best outside authorities. This task is of fundamental importance, for the international community as well as for the Bank.

Since the United Nations has the responsibility for primary data collection in this field, the Panel recommends that the Bank should request that body to undertake the basic task of constructing an interlinking system of consistent and comprehensive international statistical data on metallic and mineral commodities. If the United Nations is unable to respond to such a request within a reasonable time, the Bank should consider doing the work itself.

In the energy field, the Bank derives historical data for the developing countries and the centrally planned economies from the UN energy tape, using the UN conversion factors. For industrial countries, OECD energy statistics are used. The Bank (Energy and Fuels wing) generates projected production data for developing countries. The organization of a comprehensive set of consistent statistical data is not yet completed.

As regards computerization of the commodity data base, much progress has been made, but much more remains to be achieved. So far only the FAO tapes, the UN energy tapes and some USDA tapes can be incorporated directly into the Bank's computerized system. However, by August 1979 a compact, UNSO Geneva version of the UN Series D trade data is expected to be available in machine-readable form. 1/

1/ This will provide detailed value and quantity data for all reporting countries annually for the period 1962-1978.

The Panel recommends that more priority should be given--in the Commodities Division and other concerned units--to speeding up the establishment of a complete and fully computerized commodity data system in the Bank. Similarly, more emphasis should be placed on providing terminals for all user units in the Bank, so that they may have immediate direct access to the data in the system.

Within the context of this program, means should be found to integrate into the central data base such suitable data as can be made available on a regular basis from the operating units. As far as possible there should be only one set of consistent commodity data available on computer terminals to all Bank staff.

Efforts are being made to link the commodity data and projections to the country macroeconomic data and projections used by Bank regional staff. The Panel believes that this is a necessary development.

(b) Knowledge of the Markets

The Panel considered that the efforts undertaken by relevant Bank staff to maintain an up-to-date knowledge of the commodity markets were successful. Commodities Division staff had, perforce, to concentrate on world market developments by maintaining current statistics, following the trade and professional literature, keeping contact with the secretariats of the international bodies specializing in particular commodities, and attending the periodic sessions of all the intergovernmental commodity councils and study groups.

This concentration on the world markets necessarily meant that Commodities Division staff had rather superficial knowledge concerning the markets facing individual countries, apart from the major producing and exporting countries. With respect to smaller and less important trading countries, country economists and project staff often need more detailed market information than the Commodities Division is geared to supply. A considerable increase in staff would be needed to provide, within the Bank, for a full service of information on potential market prospects for specific types of products as potential exports from specific countries to particular market areas. The Panel considers that it would be most cost-effective to purchase such information from outside agencies, such as the International Trade Center of UNCTAD/GATT.

On the whole, the Panel felt that the commodity documents of the Bank reflected an adequate knowledge of world markets. At the same time, it stresses the importance for the specialized commodity staff to deepen progressively their understanding of the markets in areas such as the structure of the markets, the nature of the competition, the dynamic aspects, the policy constraints, and the development implications of these factors. The convenience of computerized statistical data series should not be allowed to induce an undue dependence on mechanical compilations, to the detriment of a constant search for better understanding

of the statistical series, which is the key to the market and development judgements which the Bank requires.

(c) Problems of Price Forecasting

In its annual report on price prospects the Bank presents short-medium- and long-term price forecasts in both constant and current US dollars. It has been generally accepted that the short- and medium-term projections, covering up to five years ahead, should take into account cyclical and other short-term influences including market disequilibria, whereas the long-term, covering up to 15 years ahead, should be a matter solely of trend projections, reflecting assessments of the fundamental structure of commodity markets. There is a general impression that the Bank's short-term forecasting--as distinct from its long-term analysis--is rather an ad hoc exercise, dependent mainly on market judgements based on the work of the international commodity secretariats, with some feed-in from operational staff and some unorganized consultation with the research staff of the IMF.

It is a question whether the Bank should attempt short-term price forecasts at all and rely entirely on the IMF in this field, in which the IMF is the recognized international specialist, or purchase needed reports from commercial sources. The fact that the theoretical division of labor between the Bank and the IMF does not seem to be effective operationally in this area suggests the need for clarification at the policy levels of the two agencies. If the operational requirements of the two bodies for short-term commodity forecasts do not coincide but are nevertheless complementary, it is possible that both agencies could be more effectively served by a joint staff unit working in this field. The Panel therefore recommends that the management of the Bank consider consulting with the management of the IMF to examine the case for establishing a joint service.

Serious attention should be given to the methodology of linking cyclical and trend movements in the forecast price series. This is a matter calling for basic research, and the Panel strongly recommends that it should be initiated by the Bank as soon as possible.

Another major methodological problem is the treatment of inflation in commodity price forecasts, or the relation between forecasts in constant and current dollars. In the Bank the index of international inflation is used as the deflator for the prices of primary commodities exported from developing countries. This index, which is calculated in and projected by the International Economy Division of the Bank, reflects movements in the CIF US dollar prices of developed countries' manufactured exports to developing countries.

If short-term prices are forecast in current dollars and converted into real terms by such a projected deflator, any inaccuracies in the original forecasts are accentuated. The same result obtains if--as

in long-term projections--the commodity price is forecast originally in constant-currency terms and then "inflated" by the index. There is the additional problem that the chosen inflation index is not equally appropriate for all commodities.

With Research Committee assistance, the Bank sponsored a conference at Oxford, England in 1973 on the impact of inflation in industrialized countries on commodity prices. The Panel recommends that the suggestions of this Conference be made the starting point for further research in this area. Basic issues to be explored are the differential behavior of various commodity prices under different rates of inflation at different times and places, and what better inflation index or indexes to use and how to project them.

From the operational point of view in the Bank, a further technical problem is the relation of the projected international indicator prices to the prices of particular grades, in different markets and at different stages of processing, which are required by users. In general this is an appropriate subject for econometric analysis using established techniques. The relationships are currently arrived at by operating staff, with some assistance at times from commodities staff. Some of the relationships may indeed be highly specific to individual cases, especially for mineral commodities. A further question is how to value the output of non-traded commodities in the economic analysis of production projects. This whole group of problems is extensively discussed in a manual 1/ currently being drafted in the Bank. The dialogue among commodities and operating staff involved in the finalization of this manual should greatly assist the development of consistent methodologies and identify any issues calling for further analysis or research.

(d) Reliability of Price Forecasts

Commodity forecasts and the techniques embodied in them can best be judged by comparing them with the reality after the event. This too, is a good method through which to determine the most cost-effective ways for improving reliability.

The question of reliability raises others of operational significance. Have the operating decisions of the Bank staff based on the forecasts proven correct? In other words, have the assessments that certain countries were creditworthy and others not, based on balance of payments prospects, turned out to be good operating decisions? And have the production loans justified by reference to the forecasts of commodity prices and markets proved in hindsight to be sound?

1/ Manual on the Use of Commodity Price Forecasts, Robert Bacon, Commodities Division (draft).

The Panel has not seen any systematic review or evidence on these points. However, since the first meeting of the Panel, the Bank has commissioned a study which makes a beginning in the development of techniques for the measurement of reliability, although so far it reviews only forecasts up to four years ahead. It is too early to give an evaluation of this study, but the general findings leave no room for complacency. 1/

The Bank's own recent audits of project performance indicate that, in general, price forecasts for agricultural commodities and some minerals have turned out to be conservative in that actual prices realized in production projects exceeded those anticipated at the appraisal stage. 2/ For some loans this had meant that the rate of return achieved had been greater than that on which the project had been approved. In other cases the higher level of actual prices had floated the projects above the negative effects in other components, where actual results proved more unfavorable than projected, e.g., slower increase in crop yields, higher cost of inputs, less effective management.

On this evidence, the conservative price forecasts have favored the Bank as a lender. On the other hand, they may have caused the abandonment of some loan proposals which could have proved beneficial to the potential borrowing countries. One would expect that during certain periods price forecasting would tend to be optimistic instead of conservative.

The Bank staff recognize that the price forecasts have to be revised periodically, and, if the elements of change are considered to have long-term effects, revisions are prepared and disseminated. Occasional subsequent revisions in long-term forecasts that appear rational at the time of projection are inevitable.

The Panel strongly recommends that the Bank should continue the review begun in the Ghose study, with a view to instituting as soon as possible a routine and continuing monitoring system for its commodity forecasts, designed to point to the most effective and efficient improvements in market analysis and projections methodology.

1/ Price Forecasts for Primary Commodities: An Evaluation of Past Experience, A.K. Ghose, October 1978. This study indicates that the Bank's near-term price forecasts are of doubtful reliability, but better than forecasting no change.

2/ Annual Review of Project Performance Audit Results, World Bank, November 1978, paragraphs 2.11, 3.41 and 3.196.

(e) The Use of Formal Models

(i) Recent History

The Bank's work on commodity models has developed in recent years in two main locations--the Development Research Center and the Commodities Division. 1/

In the last two to three years, the Commodities Division has been trying to evolve models designed to systematize the data and relationships in individual commodity markets. So far, models have been built by this unit for eleven commodities or commodity groups. This is essentially research work, but it has been funded predominantly within the ordinary budget of the Division, except that the jute model has been taken over from RPO project 671-09.

With central research funds made available by the Research Committee, under RPO 671-09, the Development Research Center sponsored the preparation of a world copper model, a world aluminum model and a dynamic simulation model of the world jute economy. Work was also initiated on energy and pulp and paper industry models. The objectives of this research were to "provide the analytical tools and data format to analyze global supply and demand conditions of important commodities... to determine globally optimal output, investment and trade patterns... to assess the desirability and feasibility of collusive action by developing country producers...."

This RPO project was very ambitious. The anticipated amount of consultant contributions did not materialize, and as a result, after several years of research, none of the models seems to have proceeded beyond initial versions, and final reports are not yet available.

Two other research projects funded by the Research Committee have been concerned with commodity models, namely RPO 671-23: Agricultural Commodity Projections, and RPO 671-28: Project Link. Both projects were initiated in 1975 and are overdue for completion. Project RPO 671-23 is being conducted at the University of Illinois, with the support of the Ford Foundation as well as the World Bank. The project aims at constructing a world model of grains, soybeans, cotton, beef, pork and poultry for 20 countries or regions, designed for rational planning of the world food economy.

Project RPO 671-28 was mainly designed to provide Bank financial support to Project Link, which is an econometric system of the world economy based on an international cooperative research program centered at the University of Pennsylvania. The Link Model encompasses three general commodity models provided by the Bank; project RPO 671-28 will expand those to twenty.

1/ For documents produced, see Annex 1 B.

(ii) Technical Evaluation of the Models

Formal commodity models as such play a relatively small role in the routine work of the Bank. Out of 34 commodities for which the Bank publishes regular price forecasts, there are not more than eight for which a model exists which is written up in final form and could, in principle, be used for generating price forecasts. These eight models, and a number of others at an early stage of development, have been constructed as a sideline activity by the staff members of the Commodities Division. The table below summarizes the situation as of May 1979. It will be noted that as yet only two have been cleared for publication.

COMMODITY MODELS IN THE COMMODITIES DIVISION

Model	Status			
	Incomplete	Final Runs Complete	In Final Draft	Published as Working Paper
Coffee		X	X	
Sugar I		X	X	
Sugar II	X			
Bananas	X			
Cocoa		X	X	
Fats and Oils		X	X	
Tea	X			
Rubber		X		No. 3
Jute		X	X	
Iron/Steel		X	X	
Tin		X		No. 1
TOTAL: 11	3	8	6	2

The other models produced from Research Committee funds as referred to above were not specifically aimed at producing price forecasts and, in contrast to the Commodities Division's models, are the outcome of major research efforts.

The Panel has reviewed the majority of both groups of models individually, 1/ and in this section of the report sets out its general comments and conclusions.

The Commodities Division group of models is the simpler to consider first, since these models are all aimed at the same general objective, namely, to raise the quality of the operational work of the Bank, particularly the routine work of price forecasting. This general

1/ See Annex 2.

objective can be broken down into the following particular objectives:

- to summarize the essential relationships which have existed to date in a particular commodity market, i.e., supply, demand and price relationships, and to test the stability of these; and

- either to create a mechanism capable of generating a future time series of world prices--a mechanism which can easily be updated; or

- in certain cases, to provide a facility for studying the effects of future policy alternatives, such as bufferstocks or commodity agreements.

Most of the Commodities Division models constructed in the last two years are designed to meet the first two of the above three objectives, and on average each has taken about three man-months to construct. They have all but one (iron and steel), the same basic structure. Supply equations are constructed from annual time series for major producing countries or regions; demand equations are similarly constructed for the main consuming countries or regions; and the model is closed by a price equation, in which an important element is the level of world stocks. The supply equations usually contain lagged values of the dependent variable on the right-hand side, so that estimates of both short- and long-run elasticities can be made. These models are fairly standard and contain no innovative elements. They are at least as good, in general, as comparable models used in UNCTAD or FAO, though the two latter agencies are not involved in long-term price projections. Being relatively simple in character and not very demanding as regards data, they meet the criterion that they can be easily updated by staff members who have not too much time to spare. In fact, the Division must be complimented on its overall productivity.

From a technical point of view, the main weaknesses of the internal model-building are:

(a) the models contain no cyclical elements; even though the intention is to project long-term trends, it is often necessary to take account of cyclical movements during the historic period over which parameters have been estimated;

(b) there is too easy an acceptance of a particular hypothesis (Nerlove) about the lag structure in supply. Since this leads to the inclusion of the lagged value of the dependent variable on the right-hand side, high correlations are obtained which tell one little about the structural relations;

(c) there is not always sufficient recognition of previous work done on the commodity outside the Bank; the Panel recommends that a literature survey paper should always precede the construction of a model;

(d) the parameter estimates have not been sufficiently critically examined to explain differences between countries and to look for possible changeover time; and

(e) more work should be done (as has been done for meat 1/) on the relationship between the chosen indicator prices and other important prices (e.g., for different grades of the same commodity).

The Panel is glad to note that it is planned to expose all the models at an international seminar in 1979. This type of exposition should take place, say, at two-year intervals.

Two of the models (jute and sugar) are aimed at policy simulation, that is at the first and third of the above objectives, though the structure of the models is not dissimilar from those described. The jute model is innovative in that it attempts to allow for the effect on supply of a reduction in uncertainty caused by any success attained by price stabilization schemes. This device could profitably be tried for other commodities.

One model (iron and steel) is entirely unconventional in that it uses a programming technique for the purpose of price projection. This approach has to be regarded as experimental, as it raises both conceptual and empirical problems, and its forecasting power has not yet been demonstrated.

In general, the Panel's view is that model building by the Commodities Division on about the current scale should continue to be encouraged, even though there is no chance that a formal model can ever reliably take over the complete task of price forecasting. It is an educative process and a good way of keeping up contacts with professional opinion outside the Bank. It is also a way in which subjective hypotheses of past or future market phenomena can be tested in a consistent quantitative framework.

Aluminum and copper models have been substantially completed on Research Committee Funds. These are aimed primarily at the problem of optimum investment distribution between producing countries. The effort has been put almost entirely into the supply side, and the models contain a wealth of data on technology and costs. These models are difficult to test by their nature, and in any case little attention has been given to the demand side, something which will be essential if the models are ever used operationally. Another problem is that models of this kind have a high rate of obsolescence if not kept in use, and it is unfortunately easy for them to become museum pieces if there are not sufficient

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1/ Reference: Annex 1 C, 11.

internal resources to keep them up-to-date. Particularly in the field of metals and minerals, however, this type of model building is likely to be necessary if commodity work is to be used in forming Bank policy.

In view of their high cost, the Panel has reservations about some of the other projects which have been supported by Research Committee funds, if the criterion is their usefulness to the work of the Bank. For example, it is very difficult to see any likely operational payoff in commodity work to the $100,000 granted to the study of the linkage of commodity and country models (Project Link).

The project "Natural Resources and Planning" ($165,000) has so far produced the studies on jute, aluminum and copper already discussed, but the prognosis for work on a world food model (second report, 1977 SR 671-23) is very poor. A number of quite different studies have come under the general heading of "Natural Resources and Planning" which seem to the Panel to be much too wide and not well-defined.

The Panel recommends that studies financed by the Bank but carried out by consultants should be confined to:

(a) commissioned papers on the state of the art, literature and institutions active in a particular field; and

(b) the establishment of new types of methodology in commodity market analysis not so far developed in the Bank (the copper and aluminum models are examples), provided that the terms of reference of the study are closely defined; that the progress of the study is monitored regularly; and that the Bank is satisfied that at the conclusion of the project, it possesses the resources to take over the new methodology for operational purposes.

(iii) More General Comment

In the view of the Panel there is no set of obviously superior techniques relevant to the Bank's specific needs on which the Bank's staff are seriously missing out. It is obviously possible to cite cases where more mathematically sophisticated techniques have been used elsewhere, without, however, guaranteeing that their use in the Bank would produce more reliable forecasts or policy simulations.

The Panel considers, therefore, that whatever the specific techniques used for forecasting, the principal basis must be not methodological excellence, nor necessarily the use of the most "advanced" techniques, but an in-depth understanding of the relevant relationships within the commodity sector and the economic environment which affects it. If, because of resource constraints, a choice has to be made between the attention the commodity specialists give to the development of methodology and to their maintaining familiarity with the changing

economics and institutions that characterize their industries, the Panel would give preference to the latter. In practice, it is hoped that improvements are attainable in both respects.

To this end, the Panel recommends that efforts be continued in the Bank, designed to improve the commodity models available, both formal and non-formal, and adapt them to the operational and policy requirements of the Bank. For some time to come, the major use will be in forecasting, and most of the improvements and modifications will be made by the Commodities Division staff in the course of the regular forecasting exercise.

However, the jute and sugar models, which are aimed at policy simulation, and the aluminum and copper models, which are aimed at optimal investment allocation, make an extension of the Bank's model building from the traditional task of price forecasting. The Panel welcomes this extension as a move toward the exploration of the capability of formal models in the area of general commodity policy, particularly development policy.

It also welcomes the move toward the integration of commodity models with global macroeconomic models. Though it is a wider issue which cannot be treated in this Report, the Panel wishes to note that there are many aspects of development policy in which commodity models are potentially useful. These include such issues as income distribution and employment.

9. Supporting Bank Operations

This objective is seen to have two aspects. The first is the bread-and-butter task of serving the daily operational requirements of the Bank. The other and perhaps increasingly significant task is orienting the Bank's operations in a policy issue, in the light of global trade and development issues that are or can be illuminated by commodity analysis and research. These questions of commodity lending policy will be taken up in the next chapter.

An essential requirement for the Bank, as already indicated, is that all its operational perspectives at any one time--for all countries and projects--in which commodity exports or imports feature, should be based on one view of the world market for each (and preferably all) of the commodities concerned, and that this view should reflect the most authoritative judgements available inside and outside the Bank.

By and large the Bank's commodity analysis, undertaken in various units, enables this essential requirement to be met, but with many qualifications and reservations. These relate to:

- the technical problems of price forecasting;
- the coverage of commodities;
- the definition of commodities;
- processed commodity exports;
- lack of comparable data on input costs;
- the "spot" nature of the price forecasts; and
- the aggregate nature of central commodity studies.

(a) Technical Problems of Price Forecasting

These have already been discussed in the previous chapter, including their impact on operational work through effects on the reliability of price forecasts. The Panel considers that the routine monitoring of price forecasts in hindsight, which is strongly recommended, should be extended to cover the impact on operational decisions of forecast prices which turned out to be above or below the eventual realizations

(b) Commodity Coverage

The traded commodities not dealt with in the 1978 Price Prospects report include dairy products, sheep meat, hard fibers, pepper, hides and skins, wool, forestry products other than tropical hardwood,

fishery products, plus a number of mineral commodities including cobalt, chromium, uranium and coal. For these commodities, the staff of the regional or program units concerned have to make their own market forecasts, when required.

For some of these commodities, the volume of Bank business may not warrant centralized analysis and forecasting. However, to provide centralized assistance to operational staff concerned, the Panel recommends that the coverage of the central commodity data bank be gradually extended, with the collaboration of interested units, to include a minimum of historical and current statistical material on a selected number of such commodities, to be accessed through computer terminals in the Bank.

(c) Commodity Definition

The adjustment of the standard international price forecasts to the actual qualities and types of commodities exported or imported by a particular country is not necessarily done uniformly by all groups of operational staff, causing the rigor of the Bank's standard commodity price forecasts to be weakened in practice.

A similar problem arises in converting the world market prices, as forecast, to realizable prices at the border of the country under study or at the specific project site. For this conversion, all the operational units have to make their own estimates of transport costs, in the absence of centralized data in the Bank on international freight rates. This is a very difficult area for systematic data collection, but the Panel recommends that consideration be given to initiating the assembly and dissemination in the Bank of a minimum amount of transport cost estimates for major commodity trade flows. As mentioned above, a manual on the use of commodity price forecasts is now under preparation, which should help to improve the consistency of the operational adjustments.

(d) Processed Commodity Exports

Countries which have generated a certain momentum of economic development based on the export of primary commodities normally seek to diversify their economies by industrialization. This leads usually to the expansion of exports of commodities in processed or more refined forms.

To the extent that the Bank issues standard price forecasts for primary commodities only, the Bank's operational staff working in such countries derive limited assistance. For the most part, this is not

a problem for the metallic minerals, for most of which the price forecasts relate to the refined metal, a major exception being iron ore. 1/

The Panel recognizes the major problems involved in trying to establish standard price series for processed commodities, and feels that pricing in this area should continue to rest with regional or central operating staff, until such time as Bank studies in the field of processing enable some practical possibilities for additional central services in this area to be identified.

(e) Lack of Comparable Input Cost Data

The costs of many internationally traded inputs into production projects have been rising rapidly in recent years. For the operational staff concerned with such projects, price forecasts for the commodities to be produced are only a part of their data requirements. Estimates and forecasts of prices of major imported inputs are increasingly significant in project appraisals. If there is serious lack of consistency in such estimates by different regional units, the uniformity of price forecasts for the corresponding output commodity may become irrelevant.

The Bank does make and disseminate forecasts of fertilizer prices. Other important inputs that are commonly imported for projects include insecticides, pesticides, tractors, earth-moving machinery, cement, reinforcing steel, structural steel and construction equipment. Many of these items are highly specialized, more so than refined commodity products, but markets analyses are maintained for a number of such projects in connection with industrial project operations. The Panel suggests that the Bank explore the possibility of establishing some useful standard cost estimates and projections. In any case, historical and current price series of some standard descriptions could perhaps be introduced into the central data base, for access through terminals in the Bank, if there is a widespread need.

Beyond this, it might be feasible for appropriate units in the Bank to prepare and disseminate monographs on the major input industries, describing world structure and functioning of the industry, major products, developments and price trends. Such monographs could be extremely useful, not only for project design and appraisal in the Bank, but also in other development agencies and national authorities.

1/ Iron ore presents special complications, since the processed forms (pig iron, steel ingot, etc.) usually do not move much in international trade before conversion into rolling mill shapes and forms. For these, a single price series is almost meaningless, but some sort of substitute international indicator might usefully be developed.

(f) "Spot" Nature of Price Forecasts

Some users have reservations about the realism of a single "spot" price forecast for a commodity some 10 years ahead, and find difficulty in applying it to operational decisions. On the other hand, forecasts of a price range would open up too wide a band of interpretations and practical adjustments.

The Panel feels that it would be a useful advance, not involving the development of econometric technique, to increase the awareness of users as to the sensitivity of the forecasts to the major assumptions made in their formulation. In particular, it would be helpful to indicate the sensitivity of demand for agricultural raw materials and minerals to assumptions concerning future growth of GDP or industrial production in OECD member countries.

(g) Aggregate Nature of Central Commodity Studies

It has been mentioned earlier that the Commodities Division can hardly be geared up to handle all types of detailed market surveys, in addition to covering world market developments adequately. The requirements of the operating staff for such specific surveys which cannot be handled by the central commodities unit will have to be purchased outside the Bank.

10. Orienting Commodity Lending Policy

The previous discussion has been concerned with the use in the Bank of commodity price and export volume forecasts in assessing the creditworthiness of countries and the economic viability of individual production projects. This section raises another set of issues which are relevant for the production operations of the Bank, but in terms of broader development orientation and policy.

(a) The Project Approach

The traditional Bank approach is that any production project that is viable in its national context should be assisted by the Bank. With the strong pressure within the Bank to expand its operations as fast and efficiently as possible in order to play a full role in speeding up the development of countries and people who are lagging behind in the advance of mankind, this approach of supporting individual projects has many supporters. In fact, it is probably the dominant approach and helps to account for the strong forward drive in the operational activities of the Bank.

In the earlier years of the Bank, the choice of prices for valuing the commodity output of projects was fairly haphazard, and market prospects were assessed by project analysts. The analysis of projects has been evolving toward a "world market" approach, with the establishment of centralized long-term commodity market forecasts, including price forecasts. This service has required all operating staff to appraise production projects against price forecasts that reflect the best estimates of the future evolution of world markets.

If the forecasts show stable or rising world prices due to strong or excess demand, this favors the search for and justification of new projects for increasing production of the commodity concerned. On the contrary, a forecast of falling world prices due to prospective oversupply, directs the attention of operating staff (and governments) to new production projects only under conditions where the investment can be justified even at the low prices forecast.

Despite this important evolution, the project approach remained basically the same, with operational interest focussed on the national impact of the project.

This approach, particularly appropriate in the early years of the Bank's work, remains appropriate so long as the impact of the national project on other member countries or on the world market can be regarded as negligible.

(b) Development Policy Approach for Commodities

The fact is that this price-based method of evaluation has a number of drawbacks. While adequate for individual projects, it ignores

the potential significant cumulative effect Bank projects for a single commodity may have on the world price, especially if demand for the commodity is inelastic as for coffee and tea. In such cases the project will redistribute trade shares and therefore income between countries. The income redistribution may be desirable or undesirable in itself or on grounds of comparative advantage, and these could be regarded as factors to be considered in evaluating a production project facing inelastic world demand for the product.

There is another type of situation where price in the international market has some drawbacks as a criterion for the Bank's lending operations in developing countries. This can be argued for instance, in the case of sugar and dairy products, for which the international prices are depressed--sometimes below the cost of production of low-cost exporters --by overproduction in protected markets of some developed countries and the export of their surpluses at almost dumping prices. If such low international prices are judged as likely to continue over the long term, it may be considered sound lending policy to refrain from investing in the production of these commodities in developing countries, if the investment could not be justified against imports at such prices. But would it be good international development policy for the Bank? Is this a relevant question? The Panel believes that it is, while recognizing the almost intractable nature of the problem which it poses for the Bank, especially regarding commodities of which some of its major donors are important producers or subsidizing exporters.

The issues raised by these drawbacks of the project approach can be comprehended under commodity lending policy, but they are so basic as to be considered part of development policy. Since it is well accepted that the Bank should, in the future, seek to justify projects in the wider framework of development, where world market impact is only one factor, this shift of emphasis seems both appropriate and hopeful.

Other criteria in Bank lending which are currently in use in evaluating projects and which should be viewed in this broader context include:

- employment promotion effect;
- income effect on poverty sectors;
- foreign exchange earning effect in low-income countries;
- diversification of production;
- institution-building, e.g., marketing, cooperatives, credit.

In such a wider calculus, the world market effects of commodity production elements in individual projects could be brought into the evaluation of the project.

It is beyond doubt that the Bank's production loans to certain countries do, under certain circumstances, have important development implications for other member countries. Thus, Bank loans for expanding

steel production in developing countries have led to adjustments in older producing countries. Likewise, the assistance given by the Bank group in the 1960s for the shift in coffee and tea expansion in African countries benefited these countries at the expense of Latin American and Asian producers respectively. Similarly, the policy of restricted lending for sugar and citrus expansion favors the existing producers and exporters at the expense of potential exporters.

This is indeed a problem area for the Bank. But with the rapid growth of the Bank's operations, both in commodity production and commodity processing, and especially in agriculture, the problem will not go away. In fact, it is bound to assume greater proportions. Since the Bank is a world development agency committed to the application of objective economic criteria in all its judgements, it cannot ignore the need to evolve well-considered commodity and development policies in conformity with its role and status.

"It is a fact that the international economy is growing more interdependent. That evolution can and should benefit developing and developed countries alike, but if it is to do so there must be adjustments in the global pattern of trade to reflect shifts in comparative advantage. These adjustments will not be easy, but the alternative to a more rational economic framework can only mean, in the end, greater penalties for all." 1/

There is an important commodity dimension to interdependence and international adjustment, to which the Bank will be called upon in the future to give consideration. At the very least, it should be undertaking the analyses and research which will enable it to justify what it is doing, and provide a foundation upon which to build its policies for the future.

(c) Bank's Commodity Lending Policies

The issue of global commodity interdependence was first brought to the Board's attention in January 1973, in a paper on Development Policy for Countries Highly Dependent on Exports of Primary Products. 2/ Starting from market analyses, the Commodities Division paper focussed on the slow rates of growth in value of exports from developing countries of commodities facing inelastic demand. For such commodities--in particular coffee, cocoa, tea, bananas, bauxite/alumina/aluminum and tin--the staff recognized clear dangers that Bank lending to increase production might result in depressing prices. However, there were some countries where such commodities offered the best or even the only opportunity to increase export income.

1/ World Development Report, 1978; World Bank: Foreword.

2/ Annex 1 D, 10.

On the basis of this analysis, the President proposed that the Bank should limit financing of new production of primary commodities facing inelastic demand, in general, to countries with few export alternatives. The paper was discussed by the Board, and its eventual approval constituted the Bank's lending policy for commodities facing unfavorable market prospects.

The first application of this general policy to a specific commodity--tea--came a few months later, in August 1973, when the President submitted a memorandum on "Bank Group Financing of Tea" to the Executive Directors. The need for a Bank policy on tea was precipitated by eight IDA credits made between 1964 and 1973 for financing new tea production, mainly in East Africa. It was estimated that these credits would generate 20% of the total increase in tea exports to be expected in the decade 1975-84. This increase in total supplies would exceed the slowly growing demand, resulting in a decline in world prices. Nevertheless, as the memorandum pointed out, some individual countries and their impoverished smallholders could gain from producing for export, as had happened in East Africa.

Under such circumstances, it was claimed that the conditions under which the Bank should contemplate financing tea projects ought to be strictly limited. The Bank staff recognized that a policy of limitation should ideally be based on the analysis of comparative advantage in tea production, but in view of the complexity and uncertainty of such analysis considered that simpler approaches could be used. The memorandum therefore proposed, and the Executive Directors accepted, the following policy: that as a general rule, the Bank should undertake no further financing of tea production; that any exceptions should be strictly limited to financing (i) increases in output in countries with no investment alternatives yielding an acceptable rate of return; and (ii) rehabilitation involving no increase in output; and that projects for diversification out of tea production should be encouraged where economically feasible. In the absence of any change in the long-run market outlook for tea and of an effective international tea agreement, this tea-lending policy is still in force.

In hindsight, it would appear that the Bank was slow to take policy cognizance of developments in the tea market and may have thereby been forced to overreact by withdrawing from the production side of the industry almost completely. Clearly the Bank had a responsibility to take some action. The Panel strongly supports the Bank's current decision to consult with other main international and bilateral lenders on tea production policy. Such a consultation, based on the most authoritative market analyses available, should be concerned with establishing joint guidelines, if possible, first for future tea production operations and, second, for assisting adjustments in tea-producing countries where necessary.

The Bank has been exercising similar restraint in the financing of coffee projects, in consultation with the International Coffee Organization. But there may not be many other cases where the Bank has a need at present to evolve a commodity-lending policy akin to that on tea. Nevertheless the Panel considers that the Bank, as a major and increasingly dominant international lender for commodity production, cannot for long sidestep such basic development issues as have arisen in this case, and could well develop in the future for other commodities. It is noteworthy, for instance, that the central price forecasts identify a number of commodities subject to long-term decline in prices attributable mainly to likely oversupply. It is important that the implications, if any, of such trends for the Bank's own commodity-lending policies, and for policy consultations with other lenders, be assessed in good time.

It is equally important for commodities facing favorable world market prospects to be identified and appropriate operations encouraged. Commodity papers should also be geared in this direction. For instance, policy papers might well examine factors responsible for the slow response of developing countries in the expansion of production and exports of commodities for which favorable world market prospects are widely perceived. It is understood that such a paper is currently being prepared in relation to rubber by Central Projects Staff and Development Policy Staff jointly. This could be a good example to follow.

Other papers with policy orientation 1/ have been presented to the Executive Directors since the initiatives of 1973. A paper on cocoa lending in 1974 was discussed by the Board, which agreed to the foreseen investments in this crop. Two policy papers on palm oil and one on beef were not discussed by the Board, but cleared the way for the Bank to continue supporting projects in these fields.

A policy paper on sugar in 1972 was discussed by the Board. It opened the way for somewhat more liberal lending by the Bank because of shorter supplies in the world market. Another paper on sugar, reverting to the earlier more restricted role and fitting Bank lending for production into the operational framework of the new Sugar Agreement, was put to the Executive Directors for information in 1978. A more long-term policy on this commodity is needed in the Bank.

Papers on natural rubber, the world jute economy, and the long-term problems of jute, hard fibers and tea did not seem to raise policy issues for the Bank. The important forestry sector paper, which completely re-oriented Bank lending in this sector, was likewise presented for information only.

1/ See Annex 1 D.

A policy paper on minerals and energy in the developing countries opened the way for the Bank to expand its program in fuel and non-fuel resource exploration, which was a significant innovation.

These illustrations show that commodity papers have played an important part in orienting the Bank's lending policy, as reflected in decisions or approvals of the Board. However, the papers have, for the most part, been geared to the project approach.

The Panel feels that the new orientation which it is proposing 1/ for the regular in-depth commodity studies of the Bank would help to identify development policy issues and prepare the way for the evolution of appropriate Bank policies with respect to its own operations and its initiatives in the international community.

(d) Bank Commodity Papers

In earlier sections the Panel has reviewed the methodological studies of the Bank, the Price Prospects report and the commodity policy papers submitted to the Board. In this section it records some further comments and recommendations in the light of the considerations presented in this chapter.

(i) Long-term Commodity Forecasts

As already indicated, such forecasts, whether disseminated centrally or purchased commercially by operating units, provide essential support to the project approach to Bank operations. The short commodity notes accompanying these forecasts could be modified, where necessary, to draw attention to policy or development aspects.

(ii) Current World Market Reviews

It is important, in addition, that policy and operational staff of the Bank should be regularly informed of the current market situation for all commodities of interest. But unless a sudden need arises, there seems to be no need to prepare special market reports for this purpose. It should be sufficient to obtain and distribute within the Bank copies of the periodic market reports prepared by the secretariats of the authoritative international commodity bodies, with a covering note, if necessary, highlighting any significant developments for the Bank.

(iii) In-depth Commodity Studies 2/

The Panel feels that the Bank's individual commodity studies tend to focus unduly on overall market factors and global supply, trade

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1/ In section (d) (iii) below.

2/ See Annex 1 C.

and prices. To this extent they serve well the project approach in the Bank. However, such aspects are, for the most part, adequately covered by similar studies outside the Bank. In this respect, although there are promising initiatives, 1/ the Panel feels that the Bank's commodity analysis as a whole does not yet display the development orientation appropriate for the evolution of the Bank's operations and role in the future.

The Panel recommends that the Bank's own in-depth studies of individual commodities should have a special character, different from that of other agencies and from that currently prevailing. In particular, such studies should focus more strongly on the broad development issues inherent in global commodity situations which Bank loans and policies will increasingly have to take into account, such as:

- the status of food deficits in poor countries;
- investment requirements in metals and minerals;
- the political and geographical structure of production and trade;
- progress of trade among developing countries;
- development opportunities for specific developing countries in the increase of commodity production and processing for export;
- progress toward accepted international development objectives, including those of the Bank; and
- implications of the evolving commodity situation for the role of the Bank.

In other words, commodity analysis should move more strongly into the stream of policy thinking in the Bank. This will usually entail more cooperative studies with other operational and development policy staff of the Bank and with other international bodies with specialized commodity or production knowledge.

(e) Research Needs

(i) Commodity Lending Policy

The Panel recommends that a research project be designed and implemented in the Bank for the study of comparative costs and comparative advantages in the production of a selected number of agricultural and

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1/ Especially some recent papers on fertilizers (Annex 1 C, 1), tropical root crops (Annex 1 C, 2), rubber (Annex 1 C, 7), and Near East meat situation (Annex 1 E, 1).

mineral commodities, following up both the RPO-funded projects on resource allocation in cocoa production and on copper and aluminum modelling 1/ and the study on a "stages" approach to comparative advantage. 2/

The research should be designed to lay the foundations for a more comprehensive and systematic commodity lending policy. It should take into account the cumulative effect of Bank lending for particular commodities, particularly those facing inelastic demand in world markets or artificially low prices due to subsidized exports from developed countries. The project should examine the various options associated with, on the one hand, the possibly undesirable revenue effects of lending where elasticities or artificial prices are unfavorable and, on the other, the need for investments to permit adjustments in the production of such commodities or alternative commodities within and among countries.

(ii) Processing of Commodities

In view of similar development issues arising in connection with Bank operations in the field of processing, the Panel recommends that the Bank undertake a study of factors affecting the location of processing of selected agricultural and mineral commodities. The research should start from an examination of studies already available with the Bank and be designed with a view to contributing to Bank policy and to international development thinking.

1/ Annex 1 B, 5, 12, 14.

2/ Annex 1 E, 4.

11. Improving the Bank's Capacity to Give Policy Advice to Its Members

All the current and potential commodity analysis and research activities discussed above do or would produce results which could improve the Bank's capacity to give policy advice to its members, as well as supporting or orienting its operations. However, very little of the commodity analysis and research undertaken by the Bank seems to have been designed with this purpose in view.

Various general papers on commodity policies and problems 1/ by the Bank staff can be regarded as contributing to this objective. The subjects include:

- commodity price stabilization and the developing countries;
- compensatory financing;
- possible gains to developing countries from the elimination of trade barriers in primary and semi-processed products;
- food insecurity: magnitude and remedies;
- should developing countries carry grain reserves?
- stabilization, adjustment and diversification policies for jute, hard fibers and tea.

The papers perused by the Panel have been well-researched, well-written and make an authoritative contribution to international discussion of the topic chosen. However, the scope of subjects for general commodity studies of this kind is very wide. It is important for the Bank to contribute to international debate, but if priority is to be given to long-term forecasting and a development approach to commodity lending, some constraint may be needed in the field of general studies. Papers published by Bank staff will be most appropriate and valuable in cases where there is a specific contribution of Bank knowledge, experience, research or point of view to make on an issue not far removed from the Bank's role.

The RPO research projects on comparative analysis of resource allocation in cocoa production on natural resources and planning, and on simulations of bufferstocks were apparently intended as exercises in methodology, but could be regarded as improving the Bank's capacity to give policy advice to the extent that the projects were completed.

Only the bufferstocks simulation project was completed. The resulting publications introduced an alternative approach to food security based on food import bill insurance. While a useful contribution, the subject of bufferstocks was already very much researched. There is considerable international interest in bufferstock approaches to market management, in view of the decision to establish a Common Fund. Studies

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1/ See Annex 1 E.

designed to feed into this international initiative could be useful. It is important in bufferstock modelling, however, to recognize that the existence of a national or international bufferstock may greatly change the market behavior of the private sector.

As regards advice to member governments on international commodity policies, the Bank Group was authorized by the Executive Board in 1969 1/ to play a more active role than it had been doing. In particular, the Bank Group is empowered to assist in facilitating the establishment and operation of appropriate international commodity arrangements by a series of measures which entail advice to such commodity bodies. In recognition of the world development issues inherent in commodity lending, the Bank has a practice of consulting the secretariats of intergovernmental commodity bodies with respect to the Bank's production projects for the respective commodity.

If the Panel's recommendations above are accepted, so that the Bank's commodity staff specialize on the development policy issues inherent in the commodity markets, bringing into such analysis the Bank's own data on supply conditions and costs, the Bank's commodity policy papers and the results of its research could make an important objective contribution to the evolution of international commodity policies.

1/ Stabilization of Prices of Primary Products, Part II; Report of the Executive Directors of the IBRD, Washington, D.C., 1969, page 5.

12. Broadening the Understanding of the Development Process

This objective calls for basic research rather than applied research or servicing. The limited amount of such research done in the commodity field has been that funded by the Research Committee. The main item was the natural resources and planning project (RPO 671-09), which attempted to describe and explain, through the preparation of models, the functioning of the world energy, pulp and paper, copper, aluminum and jute sectors. Although this work has not been finalized, the interim results are of value.

Another relevant RPO project was the Seminar at Oxford in 1973, which studied the link between inflation in industrialized countries and the movements in the price of selected commodities. Following up this seminar with further research, as recommended by the Panel, should add to the understanding of this aspect of the development process.

Another research project recommended by the Panel, namely on the factors influencing the location of processing industries, should also contribute to knowledge of development, as well as helping to orient Bank operations.

13. Assisting in Developing Indigenous Research Capacity in Developing Regions

Commodity research by its very nature calls for global data and global analysis. International agencies, therefore, have a marked advantage in this field. The US Government has some of the few national agencies doing international multi-commodity research. There are a few other national agencies, mostly in developed countries, which have built up competence in research on one or several important export commodities. Most such agencies utilize the reports of international commodity bodies as starting points for nationally-oriented research.

It would help in the formulation of sound national commodity policies and investment loan requests if more developing countries had a higher level of research competence in this area. But for supporting its own operations, the Bank has no real alternative but to do its own global market analysis.

However, efforts by the Bank to promote the establishment of general economic research capacity in developing countries should encompass commodity research capacity where appropriate.

In addition, there may be critical gaps in knowledge affecting assessments of market prospects for some commodities, e.g., the age structure of tree crops in main producing countries and the assessment of mineral reserves. Assistance by the Bank to promote research and data-gathering on such problems would give a high return for commodity policy formulation in both the countries concerned and in the Bank.

If the Panel's recommendations for systematic Bank research in the fields of national production systems and costs and factors affecting the location of processing are taken up, it would be highly advantageous to involve national institutions in the work in selected countries.

IV. INSTITUTIONAL MATTERS

14. Commodity Steering Committee

As indicated in Chapter III, the Panel has taken note of the participation of many units of the Bank in commodity analysis and research for an array of different purposes in many different environments. It is hard to identify any units who could stop what they are doing without the work of the Bank suffering.

The exchange of complementary information that takes place among the different units in the commodities field is commendable. However, the total work of the Bank in commodity analysis and research does not add up to a coherent whole. The situation is better in the servicing of operations than in research or dissemination, but there is nevertheless scope for more exchange of market studies and of information relevant to commodity studies and forecasting.

The Panel accepts the advantages of one central location for global commodity forecasting services in the Bank, while recognizing the need for a continued inflow of specialized commodity knowledge from certain central and regional units, especially as regards fertilizers, metals, minerals and energy.

To promote the coherence and operational/policy value of the whole range of commodity services and research in the Bank, the Panel recommends that an in-house commodities steering group be established.

The Panel recommends that the proposed group, in addition to promoting the coherence of the operational services in commodities, should also monitor the whole research program in commodities, including proposed new projects, and develop a more coherent and open system of publication for the Bank's output in the commodity field.

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ANNEX 1:

RECENT WORLD BANK OUTPUT IN THE COMMODITY FIELD

A. COMMODITY TRENDS AND FORECASTS

1. Price Prospects for Major Primary Commodities; June 1978 and June 1977: EPDCE, 1/ Report Nos. 814/78 and 814/77.

2. Commodity Trade and Price Trends; August 1978 and August 1977: EPDCE, Report Nos. EC-166/78 and EC-166/77.

B. COMMODITY MODELLING/METHODOLOGY STUDIES

1. An Econometric Forecasting Model of the World Sugar Economy; March 1979: EPDCE (draft).

2. Prospects for the World Iron and Steel Economy: The WISE Model; February 1979: EPDCE (draft).

3. An Econometric Model of the World Cocoa Economy; January 1979: EPDCE (draft).

4. An Econometric Model of the World Rubber Economy; November 1978: EPDCE (draft).

5. A World Aluminum Model; September 1978: Development Research Center.

6. The World Tin Economy: An Econometric Analysis; June 1978: EPDCE, World Bank Staff Commodity Paper No. 1.

7. A Dynamic Simulation Model of the World Jute Economy; May 1978: Development Research Center.

8. World Bank Commodity Models - Workshop Discussion Drafts - Vol. 1, Purpose and Scope, Basic Structure; April 18-19, 1978: EPDCE.

9. World Bank Commodity Models, Vol. 2 - Tin, Iron and Steel, Rubber, Jute, Energy - Demand (Raw Materials); April 18-19, 1978: EPDCE.

10. World Bank Commodity Models, Vol. 3 - Food Products (Fats and Oils, Sugar, Cocoa, Coffee, Tea); April 18-19, 1978: EPDCE.

11. Tea Model; April 1978: EPDCE, Status Report.

1/ This abbreviation identifies the Commodities and Export Projections Division, Economic Analysis and Projections Department.

12. A World Copper Model; September 1976: Development Research Center.

13. Dynamic Market Oriented World Food Projection and Planning Models; July 1976: RPO SR 671-23, Report No. 2.

14. Comparative Analysis of Cocoa Production in Selected Countries; July 26, 1974: EPDCE, SecM74-528.

C. INDIVIDUAL COMMODITY STUDIES

1. World Fertilizer Review and Fertilizer Requirements of Developing Countries, 1979; May 1979: Fertilizer Unit, Industrial Projects Department (draft).

2. Tropical Root Crops and Rural Development; February 1979: Agriculture and Rural Development Department.

3. World Grain and Rice Situation and Outlook; December 1978: EPDCE, Commodity Note No. 9.

4. World Potash Survey; September 1978: Fertilizer Unit, Industrial Projects Department, World Bank Staff Working Paper No. 293.

5. International Cotton Market Prospects; June 1978: EPDCE, World Bank Staff Commodity Paper No. 2.

6. Optimal Hedging under Price and Quantity Uncertainty: The Case of a Cocoa Producer; June 1978: EPDCE, World Bank Commodity Note No. 6.

7. The World Rubber Economy: Structure, Changes, Prospects; June 1978: Joint Staff Study by World Bank (EPDCE) and FAO.

8. Long-Term Projections of Steel Consumption; May 1978: EPDCE, World Bank Commodity Note No. 4.

9. Copper: Current Situation and Short-Term Outlook; May 1978: EPDCE, World Bank Commodity Note No. 3.

10. Structures and Trends in the World Tobacco Market; December 1977: EPDCE, World Bank Commodity Note No. 2.

11. Toward Selecting a World Indicator Price for Beef; December 1977: EPDCE, World Bank Commodity Note No. 1.

12. Fluctuations in Invisible Stocks: A Problem in Copper Market Forecasting; October 1977: EPDCE, World Bank Commodity Paper No. 27.

13. Market Structure of Bauxite/Alumina/Aluminum: Prospects for Developing Countries; March 1977: EPDCE, World Bank Commodity Paper No. 24.

14. World Phosphate Survey; 1979: Fertilizer Unit, Industrial Projects Department, Ref. No. R403 (draft).

15. Energy Demand Forecasting: A Critical Review of Current Approaches; February 1977: Energy, Water and Telecommunications Department, P.U. Report No. RES 10.

16. Energy Supply Demand Outlook, 1980-1985; July 18, 1974: Energy, Water and Telecommunications Department, Background Paper No. 2 for IBRD Report No. 477.

17. The World Jute Economy, Vol. I; July 12, 1973: South Asia Regional Department, Report No. 114a-BD.

18. Prospects for Palm Oil; July 1976: EPDCE, World Bank Commodity Paper No. 23.

19. Tropical Hardwood Trade in the Asia-Pacific Region; 1974: EPDCE, World Bank Staff Occasional Paper No. 17.

D. PAPERS ON BANK LENDING POLICY FOR COMMODITIES

1. Bank Financing of Tea - A Reappraisal; February 1979: EPDCE.

2. The World Sugar Economy: Review and Outlook for Bank Group Lending; February 2, 1978: EPDCE, Report No. 1894.

3. Forestry; February 1978: Central Projects Staff, World Bank Sector Policy Paper.

4. World Grain and Rice Situation and Outlook - 1977; July 27, 1977: EPDCE, for information of Executive Directors, SecM77-608.

5. Tin Buffer Stock; May 23, 1975: EPDCE, memorandum from President to Executive Directors, SecM75-378.

6. Minerals and Energy in the Developing Countries; May 4, 1977: Office of Vice President, Finance, Report No. 1588.

7. Fertilizer Requirements of Developing Countries; March 1974: International Finance Corporation.

8. The World Cocoa Market - Review and Outlook for Bank Lending; February 5, 1974: EPDCE, for Executive Directors Meeting, R74-36.

9. Financing of Tea; August 17, 1973: EPDCE, memorandum from President to Executive Directors, R73-206.

10. Development Policy for Countries Highly Dependent on Exports of Primary Products; January 4, 1973: EPDCE, memorandum from President to Executive Directors, R73-3.

11. Market Prospects for Rice - Framework for Commodity Lending in 1973-74; October 16, 1972: EPDCE, Background Paper for Executive Directors, SecM72-524.

E. GENERAL PAPERS ON COMMODITY POLICIES AND PROBLEMS

1. The Outlook for Meat Production and Trade in the Near East and East Africa; December 1977: Joint Staff Study by FAO and the World Bank (EPDCE).

2. Food Insecurity: Magnitude and Remedies; July 1977: Development Economics Department, World Bank Staff Working Paper No. 267.

3. Commodity Price Stabilization and the Developing Countries: The Problem of Choice; July 1977: EPDCE, World Bank Staff Working Paper No. 262.

4. A "Stages" Approach to Comparative Advantage; May 1977: Office of the Vice President, Development Policy, World Bank Staff Working Paper No. 256.

5. Possible LDC Export Gains from Elimination of Trade Barriers in Major Primary and Semi-Processed Agricultural Products; April 1977: EPDCE (draft).

6. A Perspective on the Foodgrain Situation in the Poorest Countries; April 1977: Policy Planning and Program Review Department and Agriculture and Rural Development Department, World Bank Staff Working Paper No. 251.

7. Coffee, Tea, Cocoa - Market Prospects and Development Lending; 1977: EPDCE, World Bank Occasional Paper No. 22.

8. Export Incentives and Export Performance in Developing Countries: A Comparative Analysis; January 1977: Office of the Vice President, Development Policy, World Bank Staff Working Paper No. 248.

9. Statement made before the House of Lords Select Committee on Commodity Prices; December 8, 1976: EPDCE (mimeograph).

10. Developing Country Foodgrain Projections for 1985; November 1976: EPDCE, World Bank Staff Working Paper No. 247.

11. Stabilization, Adjustment and Diversification: A Study of the Weakest Commodities Produced by the Poorest Regions; November 1976: Development Economics Department, World Bank Staff Working Paper No. 245.

12. The International Dialogue on Commodities; June 1976: EPDCE, World Bank Reprint Series No. 39.

13. Energy and Petroleum in Non-OPEC Developing Countries, 1974-80; February 1976: EPDCE, World Bank Staff Working Paper No. 229.

14. Compensatory Financing: A Quantitative Analysis; December 1975: EPDCE, World Bank Staff Working Paper No. 228.

15. Raw Materials: US Government Stockpile As Compared with World Production, 1950-1974; June 9, 1975: EPDCE, Office Memorandum.

16. Agriculture and International Trade: Some Issues of Interest to the Developing Countries: Address to the Third Annual International Trade Conference, Seattle, May 12, 1975: EPDCE.

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ANNEX 2:

BRIEF REVIEWS OF SELECTED INDIVIDUAL COMMODITY MODELS

The World Tin Economy: An Econometric Analysis
World Bank Commodity Paper No. 1, June 1978

This is an orthodox econometric model, with supply equations for 7 producing countries and 1 for the rest of the world; demand equations for 6 regions; and a price equation. The supply equations are usually functions of the previous year's supply, the LME spot price, deflated, and time trends and dummy variables. The demand equations are divided for each region, where possible, between tin consumption for tinplate and other uses. For tinplate use the explanatory variables are usually the lagged price of tin, the ratio of electrolytic to total tinplate production, and sometimes the price of aluminum and dummies. For non-tinplate uses the explanatory variables vary more from region to region, including, for example, indices of industrial production, of machinery and construction production, and of transport equipment production. For the price equation the explanatory variables are the price lagged one year, world stocks and the US wholesale price index.

On the supply side, the main criticisms are the very simple lag structure and the lack of differentiation between investment in capacity and production. The demand equations are successful over the historical period since they are tied rather closely to the uses of tin. From a prediction point of view, however, the problem is merely shifted from the projection of tin consumption to the projection of such variables as tinplate production, the production of machinery and construction goods, etc. Even the secular substitution against tin hangs on the proxy variable--the ratio of electrolytic to total tinplate production--which can also be affected by the macroeconomic situation. It seems that the demand equations should be supplemented by equations linking the end-uses of tin to the macroeconomic variables on which assumptions can be made which are common to all commodities.

The inability of the price equation to reproduce sharp changes in tin prices reflects the difficulties for a commodity which can be stocked and for which there may be strong speculative factors influencing the market. From the point of view of long-term projections, such a weakness in the price equation is perhaps tolerable, but it does raise the problem of linking the shortrun, in which expectations and speculation can exacerbate the effects of a disequilibrium situation, with the long-run. It also creates difficulties for the use of the model, as it is used in this paper, for the simulation of possible bufferstocks policies. The price equation needs to be much more sophisticated than the present one, which superficially solves its problems by the use of dummy variables (variants 2 and 3), and probably ought to take account of US sales from strategic stocks.

One has to question the final conclusion with regard to future prices: "...it would appear... that tin producers can look forward to a period of slow, but steady, rise in import demand for this metal as well as prices.... However, as a result of lags that characterize the response of demand and supply... the current price boom will be followed by a period of much lower real prices which is likely to begin in the early 1980s and to last until the mid-1980s." The second half of this statement does not appear to be derived from the model, nor is the view of lag structure implied in the quotation reflected in the model.

An Econometric Model of the World Cocoa Economy
January 1979 (draft)

This again is an orthodox econometric model, with demand equations for 8 regions, supply (lagged adjustment) equations for 6 countries, a world price equation, and 2 producer price equations. Although cocoa is a tree crop with a gestation lag of 4 years and an interval to maximum production of 12 years, in only two countries was this explicitly recognized in the supply equations. It is curious that in the section discussing the supply equations, there is reference to only one piece of previously published work (D.L.L. Shu, 1975), when in fact a great deal of previous research has been carried out, especially with reference to conditions in individual countries.

The implied (price) supply elasticities range from 0.2 to 1.7, but there is only cursory reference to this range and no explanation is offered. Consumption, proxied by grindings (it may be true that no recent consumption data are available in published form, but are there no unpublished data available?) is usually explained as a function of GNP and price, but the presence of the lagged value of the dependent variable as usual confuses the issue and makes it difficult to assess the role of the economic variables. What, however, seems so remarkable as to be unacceptable without detailed justification is the projection that consumption (grindings) will increase by a factor of 4 during the 12 years from 1978-90, when over the observation period 1962-76, consumption in North America has fallen, in Western Europe has been approximately static, and the world total has increased only by some 30%.

The implausibility of these results was recognized by the authors who have produced a new version of the model by revising the supply equations for 4 producing countries, essentially by changing the assumed lag structure of the assumed supply response to prices (sometimes increasing and sometimes decreasing the lag). The fact that these changes result in a revision of the projections so that the increase in production and grindings over the period 1978-90 is reduced to about 50%, while "the

simulations with the new model differed only slightly from the simulations with the original cocoa model," induce a certain despondency, rather than providing reassurance. That the "projections are roughly in line with currently available information about plans to expand cocoa production in major producing countries" again makes one doubt the whole methodological and epistemological approach. If an econometric model has to be manipulated until its projections come into line with information already available, we are dangerously near to practicing computerized black magic.

An Econometric Model of the World Rubber Economy
World Bank Staff Commodity Working Paper No. 3, November 1978

This is an orthodox econometric model of the supply, demand and price of natural rubber. The supply equations covered 3 countries plus the rest of the world. The demand equations were in two stages: demand for total elastomer was estimated for 6 regions; and the market share of actual rubber was estimated for the same 6 regions. To this was added an estimate of demand for natural rubber by China. The NY spot price for RSS 1 was estimated as a function of world stocks and the price of synthetic rubber. Simultaneity was avoided by time lags in the supply equations.

Judged by elasticities, the model performs reasonably. Supply price elasticities vary from 0.2 to 0.25 in producing areas; the price elasticities for natural rubbers' market share varied from 0.1 to 0.4 by region, short-term, and for the two regions for which estimates were made, from 1.2 to 1.8. Spot prices showed a strong inverse-relation with world stock and a positive relation with synthetic prices.

A criticism of this model is that it conceals too much. In the demand for total elastomers, it is argued that, since a large part of the demand is derived from automobile production which is dependent on GNP, and most of the rest can also be linked to GNP, it is sufficient to use GNP as the main explanatory variable. This is true, but much more information would have been provided by a disaggregation in which these relationships could have been seen more explicitly. The demand for new automobiles and for replacement tires for the national automobile park, relates differently to GNP in different countries, and an understanding of this would be helpful for prediction. The present equations rely too much on the assumption that a number of concealed links between demand for elastomers and GNP will remain in the same form as in the past. Since the mid-point of the data series is 1965, and we are interested in projecting into the 1980s, such an assumption is dangerous.

In the market share equations for natural rubber, the lagged value of the dependent variable appears also on the righthand side. While this allows the interpretation that there is a distinction between short- and long-term elasticities, this is not the only interpretation, given the high inevitable correlations between values of a variable at times t and t-1. In such a case, it should require investigation and explanation, when such a formulation works for all regions except apparently Japan, and for the CPE countries it is also necessary to include a quadratic function of time.

By such arbitrary means it is possible to get a good fit to the data, but we are left with the unpalatable result that when the model is used to project prices from 1977 (US$900/metric ton), the range of possibilities in 1982 is $846 to $1,549. A result spanning this range might have been arrived at more or less by verbal reasoning. The real criticism, however, is not so much the wide range of projections, but the fact that very little can be done about them. The model simply does not provide enough information to get much beyond this result. What it could provide it has not been asked to, nor is there any discussion of what lies behind the high and low assumptions of GNP growth and inflation (how does inflation enter the model in any case?). It is depressing to have to state that the final conclusion--"Rubber producers can, therefore, look forward to a period of steadily rising prices"--is not scientifically supported by the analysis as such. It seems rather to rest on "available information about the world rubber economy" referred to (in what seems a completely inadmissable way, as by sleight-of-hand) in the sentence which precedes the conclusion.

Sugar: Econometric Forecasting Model of the World Sugar Economy
March 1979 (draft)

This is a substantial econometric model based on annual time series for the period 1951 through 1975. There are supply equations for 34 countries or groups of countries, demand equations for 131 countries, and a world price equation. This degree of disaggregation is greater than necessary for making forecasts and simulating at the level of the world market, but the model was also intended to be useful at the level of individual countries.

The report on the model contains a careful description of the institutional characteristics specific to the sugar market, and the model takes these characteristics into account. It is possible that professional opinion would vary on the particular formation chosen, but the one used is at least as valid as any other and presents a more consistent global picture than any previously available. For example, the world price used

in the model is a weighted average of the price in the US preferential market, the price in the Commonwealth preferential market, and the residual world price, whereas an alternative approach would have been to separate these markets, at the same time providing links between them. However, since the basic data set has been established, further experiments would always be possible. Table 1 of Annex 1 shows that there have been some significant diversions of prices in the three markets during the estimation period.

The supply equations based on a lagged response of producers to changes in price are expected to differ between beet and cane producers and produce a range of supply elasticities, most of which can be plausibly interpreted. The short-run elasticities are small and all but one lie in the narrow range 0.0 to 0.3. Within this range the variation differs according to market conditions, particularly according to the degree of government intervention designed to insulate producers from the residual world price. The long-run supply elasticities are both larger and more variable, the range being from 0.1 to 4.9. Again, within this range, most of the differences between countries can be reasonably interpreted, there being, in addition to other explanatory factors, a positive relationship between the size of the supply elasticity and the rate of growth of consumption.

The demand equations are classical equations depending upon population, income and price. In this case the divergence of retail prices in individual countries from the world price is sidestepped by taking both income and price elasticities from FAO analyses which were carried out at the individual country level. There is, however, an implicit assumption that, in the cases of countries for which price elasticities were used (countries depending for a large part of their consumption on imports from the residual world market), retail prices moved proportionately to the residual world price.

After testing the model for fit to the historical series, simulations are then performed under different assumptions related to the 1978 International Sugar Agreement. These simulations are very interesting and clearly worth taking seriously on the basis of a wide discussion.

A very acceptable feature of the report is the large number of graphs and tables which enable the reader to follow the calculations as easily as possible.

A Dynamic Simulation Model of the World Jute Economy
May 1978 (draft)

This report is a study of the world jute economy with the specific intention of studying the implications of alternative policies such as compensatory financing, tariff policy and acreage limitations. It is a classical econometric model in that it is based on supply and demand equations and a price equation.

An important innovative feature is that it attempts, in the supply equations, to allow for uncertainty as well as a lagged response to actual price. In the simulations, first a deterministic model is run, in which rules are given to a bufferstock agency. Then a stochastic model is run, in which random stocks are applied to the supply equations, for comparison with the deterministic runs.

Broadly, the results show that attempts to stabilize prices at around their average historical levels would be feasible, and with a profitable bufferstock operation. Attempts to raise the price either once and for all or on a rising trend by inducing supply increases in face of an inelastic demand would lead to large losses by the bufferstock authority. These losses would be roughly offset by gains to the producing countries. These gains would be unequally distributed because of the differential response of supply to price in the producing countries.

These results are clearly worth wide discussion. From a technical point of view, it is not clear whether the inclusion of terms in the supply equations to reflect producers' reactions to the diminished uncertainty created by stabilization policies is a significant element in the results obtained. Of course, it may be argued that even if it is not, it is helpful from a policy point of view to know that. Against which it may be said that, just as the Nerlove approach is only one specific approach to the problem of lagged response, so the present representation of uncertainty by the lagged variance of past observations is only one possible representation of uncertainty. The question must remain unresolved until the method has been tried for other appropriate commodities.

This model has the virtue that it is not too difficult to apply and needs no new data.

Prospects for the World Iron and Steel Economy: The WISE Model
February 1979 (draft)

This paper represents the current stage in the development of a model for the world iron and steel economy, based on the premise that steel producers formulate and carry out their investment plans on rational grounds with perfect foresight in a market environment which ensures that prices cannot widely diverge from costs for more than short periods. This is clearly a bold endeavor, when it is recalled that, for example, manning ratios differ widely in different producers countries, even when similar technologies are used; that in some countries, such as the UK and Italy, the steel industry is publicly owned and employment policy has dominated market considerations on a number of occasions; and that in many other countries, regulatory policies are followed for the purpose of protecting the domestic industry. Probably what makes the approach feasible is the dominance in the world market for Japan as a producer, especially the dominance of Japan as the major incremental producer and exporter. The increment of production in Japan comes from greenfield sites embodying the latest technology.

However, the author recognizes the market imperfections referred to above and in fact presents two alternative models, Model A based on perfect rationality and foresight, and Model B constrained by actual investment decisions during the 1970s. The main technical advance in these dynamic models is the simultaneous solution of the dynamic investment program for each year from the starting point over a planning horizon assumed to extend to 1990. As was to be expected, Model A failed to correspond with reality as a result of the optimism of the industry in the early 1970s and the consequent failure to foresee the depression of the mid-1970s. It, nevertheless, projects a fairly smooth progression of prices through the 1980s to 1990. Model B, due to its acceptance of over-investment in the 1970s, forecasts a steep decline in steel prices after 1985.

Such models are, of course, very demanding of good technological information, but this is perhaps the smaller part of the problem when considered purely as a problem of price forecasting. Because of the importance of investment and the long gestation lags, dynamic models of this kind must be expected to produce fairly dramatic solutions, and relatively small errors in forecasting market conditions in the early part of the forecasting period will have sharp repercussions later on.

What, therefore, assuming that the models can be further refined, can they be expected to contribute to the operational role of the Commodity Price Forecasts? It seems that they can be useful in probing alternative possibilities some 10 to 15 years ahead, and particularly useful in highlighting the fairly wide range of possible outcomes. For the short- to

medium-term, it would seem wise to utilize more conventional models more closely tied to actual behavior and market imperfection, plus, of course, a knowledge of the detailed institutional structure of national steel industries and of world trade conditions.

A World Copper Model
RPO 671-09 September 1976 (draft)

This model considers production decisions in 6 primary producing areas which utilize only primary copper, and 7 primary and secondary producing areas which process both primary and secondary copper at smelters and refineries. The world is divided into 13 market areas.

The model, which is based on a mixed integer programming system, exploits the fact that much copper is produced by large transnationals and that much technological and cost information can be obtained, including international transportation costs.

Essentially, the model as presented accepts the demand for refined copper in the 13 marketing areas of the world in 1973, 1980 and 1990 as estimated by a previous study (Fisher, Cootner and Bailey, 1972) and estimates the way in which the demands are likely to be distributed over the producers. Clearly the work is based on many previous essays in the development of similar models and on a great deal of information on supply conditions. To this extent, it can be considered as a more mature example of the type of model being developed by Mr. Hashimoto for the world iron and steel industry.

From the point of view of the Bank, the crucial question will remain as to the projection of future demand conditions, here taken as given. These have an importance not only insofar as there may be uncertainty as regards the total demands in different regions, but also in the division of demand between producers of the primary metal and the recovery of scrap. As in the case of the WISE model, it is recommended that more conventional studies should supplement the further refinement of this type of model. A further crucial factor is the evolution of the substitution relations between copper and aluminum in electricity generation and distribution.

It may be added that specialized studies such as "Fluctuation in Invisible Stocks: A Problem for Copper Market Forecasting," World Bank Commodity Paper No. 27, October 1977, M. Radetzki, provide both more insight, which can be used in a qualitative sense to check model projections, and also a useful input into model design itself.

A World Aluminum Model
September 1978

This is a very detailed study of the world aluminum market, based methodologically on the approach developed for other markets by the author and others in the last 10 years. The model falls into the class of cost minimization models using demand conditions estimated from the projection of econometric equations. Various scenarios are investigated on the basis of major strategic assumptions, with a time horizon extending to 1990.

As in other cases, the greater part of the research effort is devoted to supply conditions and the solution of these by a cost-minimization assumption. The estimation of demand for aluminum in individual countries is very briefly discussed and amounts to little more than a presentation of the estimates. As far as one can determine, the paper contains little or no discussion of the correspondence between projection and reality, and from within the document it is very difficult to appraise its validity as an operational tool.

Judged by the detail of the information collected on supply conditions and the obvious depth of knowledge from a producer's point of view which is displayed, one expects that the model is a highly polished one within its own terms of reference. An appropriate strategy for the Bank to adopt in such circumstances might be to leave the development of such sophisticated supply models to outside consultants, relying on the informed opinion of other experts in the field, and devote the Bank's own resources to an investigation of demand factors and the choice of scenarios for which to use the supply models. Since these models typically relate to metals for which the demand is derived, often at several stages separation from final goods, major errors are easy to make. The link through to final demand, with substitution possibilities threatening at each stage, itself presents formidable problems. Perhaps the Bank staff may be better equipped to investigate these problems than outside experts who view the world mainly from the point of view of the producing industries.

It could be added, however, that an additional use of this type of model, apart from projections, is more directly in cost-benefit calculations.

Dynamic Market-Oriented World Food Projection and Planning Models and Their Empirical Results for 1970-74 for World Food Situation
Report 2, July 1976
RPO: SR 671-23

This report is a good example of work which the Bank should not allocate to outside consultants. It is well-known by now that grandiose model building at the world level, which claims to have solutions to most of the world's food problems, is a non-starter. Such model building, complex enough for a world divided into 2 regions and containing only 8 commodities, inevitably becomes more and more complex, until it sinks beneath its own weight.

In this particular case, even the theoretical basis of the model is open to stringent criticism, since it makes so many strong assumptions, such as perfect competition and foresight, and is forced to adopt so many simplicications out of computational necessity, that it is incapable of throwing any light on the nature of the real world. And the more regions, the more commodities and the more time-periods are included in such a model, the greater its incapability will become.

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ANNEX 3:

SOME OBSERVATIONS AND SUGGESTIONS CONCERNING ENERGY AND COMMODITIES IN THE RESEARCH PROGRAM OF THE WORLD BANK

by

Ali A. Attiga

The following are some brief observations and suggestions concerning my participation in the first session of the Advisory Panel on Commodities established by the Bank.* Unfortunately, due to my late arrival, I was not able to join the Panel for the important briefing session which took place Monday, July 10. Also, it is regrettable that my present duties prevent me from continuing my work as a member of the Panel, but, as conveyed to the Bank, I shall be glad to read the final report of the Panel and offer my comments as appropriate.

Energy in the World Bank

From the point of view of developing countries, perhaps one of the side benefits of the 1973-74 oil price adjustments was greater involvement of the World Bank in the energy problems and options of its member countries. Prior to the oil price adjustments, the Bank confined its activities in the field of energy to studies and investments in electric power, especially hydroelectric power in developing countries.

The initial reaction of the Bank to the so-called energy or oil crisis was perhaps naturally directed to the impact of the increase in oil prices on the accumulation of foreign liquid assets held by the oil-exporting countries. But, unfortunately, the Bank overreacted in this regard with the result that its forecasts of so-called OPEC surplus funds were greatly overestimated in comparison with other forecasts published in 1974. Compared to actual figures, the Bank's initial forecasts turned out to be about four times greater than the present accumulated surplus of OPEC countries.

After that initial and rather hasty jump into the deep water of global oil and energy problems, the Bank undertook a series of useful studies dealing with the relationship between the price of energy and potential growth in developed countries, the energy needs and potentials of developing countries, and it tried to develop a dynamic model of OPEC trade and production.

At present, work on energy is divided between the Economic Analysis and Projections Department, including the Commodities Division, the Development Research Center and the Energy, Water and Telecommunications

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*The Panel held its first session from July 10-14, 1978 in Washington, D.C.

Department. The Department for Development Economics, along with regional departments, may also get involved in energy studies and related issues. From the point of view of more efficient allocation of resources, a better division of labor in the energy field seems necessary and highly desirable at this early stage of the Bank's involvement in this area. There may be different ways of achieving such division of labor, but two main approaches are suggested here.

One rather simple and clearcut approach is to consolidate all matters dealing with energy in the newly-created Energy Division. Since the main task of this Division for the foreseeable future is to promote development of domestic energy resources of energy-importing developing countries, it will need to undertake periodic studies of the energy situation in these countries. Perhaps it would be more efficient to concentrate all the staff needed for the preparation of such studies in the Energy Division, where they could be in daily contact with the operational staff and maintain a continuous relationship with energy-oriented institutions in the developing countries and indeed the world at large. In this case, the research staff can also participate in the country missions and project studies undertaken by the Energy Division. Such a close relationship would give them the advantage of planning their studies and making their estimates and forecasts on the basis of the actual needs and expectations of the energy authorities of the countries assisted by the Bank. It would also give the operational staff in the Energy Division direct and daily contact and interaction with the energy staff of the Bank, which should facilitate better coordination and more efficient allocation of resources in the Bank's energy-related activities.

Another approach is just to follow the usual Bank system of functional division of labor as it exists in other fields such as agriculture and industry. In fact, this approach is already being practiced in the case of energy. Generally, it would allocate global data collection and energy forecasts to the Commodities Division, perhaps energy planning and programming to the Economic Development Department, some basic energy modelling and research to the Development Research Center and, finally, all operational matters to the Energy Division. Under this approach, one can see an active role for the regional departments, especially those with large energy exporters and/or importers among their member countries. However, as the work of the Bank expands in the various aspects of energy supplies and options, this approach may complicate further the internal coordination problems of the Bank. It could also deprive it of the opportunity to create the necessary specialization in the energy needs and potentials of developing countries due to excessive fragmentation of energy discipline within the Bank.

The Bank's management will have to decide on which of these approaches it wishes to adopt for pursuing its objectives in the energy field. Perhaps a general look at the nature of the work required for this purpose will help in selecting the most appropriate approach.

At present, the Commodities Division collects global data on energy supply and demand from published sources. It also includes oil prices in the tables of commodities contained in its annual report on Basic Primary Commodities. Forecasting the prices of oil and other sources of energy is not contemplated in any serious way due to the administered nature of these prices. Moreover, there are many other regional, national and specialized energy research institutions which periodically make such forecasts. The energy research staff can readily make use of these forecasts and adopt them to its own needs. In fact, the Commodities Division currently depends on a London-based consultant for much of its information on oil and energy. It is doubtful that the Bank would be able in the near future to collect and produce its own primary energy data on a global basis. It is neither well-placed for this kind of work nor, in my opinion, should this be its primary concern.

On the other hand, assisting the energy-deficit developing countries to develop their domestic energy sources would require systematic collection of primary data on energy consumption by sector of the economy and source of energy. It would also require data on energy pricing and domestic pricing policies in these countries. In order for the Bank to succeed in performing this task, it should provide adequate technical assistance to these countries in the organization and initial management of their energy programs, which should begin with the formulation of the national, and where appropriate, regional data base, needed for the formulation of such programs and policies. This kind of work is rather operational and can be readily tied to the project-lending activities of the Bank. As the Bank would need to assess the overall energy situation and potentials of each country or group of countries before it could decide on its lending priorities in the field of energy, it would seem desirable to combine the technical assistance program in energy with the lending operation for specific energy development projects. Such a combination could help the Bank obtain primary data and design overall energy programs for the countries assisted, which would be rather difficult to do if approached in isolation. Indeed, the developing countries need to formulate national and regional energy programs for meeting their development needs, and the Bank should be in a good position to assist them in this regard.

As the energy needs of most developing countries consist of either creating or increasing their domestic energy resources, it is clear that project identification, evaluation, financing and implementation should constitute the bulk of Bank activities in this field. Systematic data collection and adequate formulation of energy programs are essential for this type of work. This would argue for consolidating the energy activities of the Bank in the Energy Division, since that division is already in possession of abundant data on electric power and is responsible for the operation of all Bank lending in energy.

Another policy consideration for the Bank is the kind and extent of its investment in the energy field. As explained to the Panel, the Bank has decided to act as a promoter of investment and to direct its lending to energy development projects, mainly for oil, gas and coal, but also for nuclear and unconventional sources of energy. Enhanced oil recovery could also obtain Bank lending. As far as exploration is concerned, the Bank would lend for development exploration, but not for exploration as such. It plans to lend about $500-600 million per year over the next five years. While this policy represents a radical and progressive shift in the Bank's position on investment in the hydrocarbon industry, it is still far short of meeting the basic needs of developing countries in the discovery and development of their domestic energy resources. One such basic need is the provision of some risk capital for exploration. For understandable reasons, the Bank finds it too risky to use its own resources or borrowing facilities for this purpose. But it may be desirable to study the feasibility of establishing a separate exploration Fund for this purpose, either along the lines of the UN Fund for Natural Resource Explorations, or a different kind of Fund which would participate in the venture capital for oil and gas exploration and share proportionately in earnings from successful discoveries. The funding of such a scheme could come from annual contribution from the Bank's earnings and contributions from industrialized countries interested in expanding the energy base of developing countries to reduce their dependence on imported oil and thus leave more of it for exports to industrialized countries. These contributions may come from public appropriation for energy development in the oil-importing industrialized countries. The OPEC Special Fund is already providing some highly favorable financial assistance to developing countries in the development of their energy resources.

The World Bank is well-placed to activate the interests of public, regional and international financing institutions in the provision of essential risk capital for the discovery of domestic energy sources, especially hydrocarbons, in the developing countries. Once such resources are located it should be relatively easy for the developing countries to obtain development financing through regular established banking and investment institutions. Perhaps for these reasons it would be more effective for the Bank to use its relatively limited resources for assistance in financing exploration, rather than development activities.

Other Suggestions Related to the Work of the Commodities Division

1. The Data Base

In addition to the existing data sources now in use, it would be desirable and perhaps essential for the improvement of the data base to make better use of the vast country and project data concerning commodities assembled by the regional staff of the Bank in the course of its country

and project-oriented studies. At present it seems that little or no use is being made of this potentially rich source of relevant primary data. Commodity data collected by UN specialized agencies, such as the FAO, should provide the Bank with much of its global data needs for agricultural commodities. The adoption of such policy could help reduce wasteful duplication and promote cooperation between the Bank and other relevant regional and international institutions.

2. Practical Use of Forecasting

The regional staff of the Bank seem to have considerable difficulty in adapting the global forecasts of the Commodities Division to the specific case of a particular country or region. It would seem highly desirable to achieve greater contact and integration between the work of the Commodities Division and the regional staff in the formulation and analysis of field surveys, data analyses and market forecasts. At present there seems to be no organized forum of consultation or cooperation between the regional staff and the Commodities Division in the case of forecasting. I am sure Professor Brown of the Panel will cover this subject in detail and make recommendations for improving this situation. There is also need for closer cooperation between the Bank and the Fund on balance of payments forecasting, especially in the case of medium-term forecasting which the Fund is making regularly in connection with the Extended Fund Facilities.

3. Scope and Orientation of Research

It is assumed that research in the Commodities Division is carried out in response to the policy needs of the Bank. But it is not clear whether the Bank's policy is formulated in such a way as to facilitate the efficient division of labor between the departments involved in research. At present it seems that there is poor linkage between these departments in the case of research formulation, execution and exchange of results. There would seem to be an urgent need for more contacts and closer coordination between the policymakers of the Bank and the research staff on the one hand, and between the research staff of different departments on the other hand.

Some of the research papers shown to the Panel seem to place too much emphasis on the theoretical question of comparative advantage in the production of certain primary commodities in two or more developing countries, with the object of orienting Bank lending to projects and countries with the highest advantage. It would seem reasonable to suggest that the Bank, as a world development institution, should conduct its research more in the direction of identifying and emphasizing the potential and existing advantage of certain developing countries over industrialized countries in the production of certain basic commodities such as sugar. At present Bank research activities in commodities seem to reinforce the existing market structure and economic relationships between the developed

and developing countries. What is needed, in my opinion, is more economic research aimed at exploring the benefits of more efficient division of labor between developed and developing countries in the production of certain basic commodities. The production of semimanufactured goods and certain manufactured products in which some developing countries either have or could be made to have clear advantage should become the subject of extensive research by the Bank. There could also be more coordination between the research staff of the Bank and the work of UNCTAD in focusing attention on the benefits of giving the exports of developing countries greater access to the markets of advanced countries. More coordination with the UN agencies, such as FAO, UNDP and regional development banks and institutions, would seem highly desirable and even necessary for improving the quality of research and increasing its relevance to the real problems and policy issues facing the developing countries. The lending power of the Bank can play a vital role in giving substance to such coordination on a regular and systematic basis.

4. The Need for Building Research Capability within the Developing Countries

It is within the research objectives of the Bank to assist developing countries in the formulation and development of their research institutions. Yet there seem to be no specific project within the Bank that is designed to implement this policy. Obviously such an important and long-term objective cannot be left to ad hoc arrangements, usually made as a byproduct of regular Bank activities. Rather it would seem necessary to establish within the Bank a specific unit charged with the responsibility of creating and strengthening economic research capabilities within the development banks, planning institutions and ministries of finance of developing countries. Priority should, in my opinion, be given to small countries with little or no research background; it is in such countries that the Bank could make the greatest impact. Emphasis should be placed on domestic data collection, storage and analysis, as well as on publication of results where appropriate.

5. More Efficient Dissemination of Research Results

The question of wider and more effective dissemination of Bank research within the developing countries is highly related to the previous objective of building their domestic research capabilities. At present the research papers and reports distributed by the Bank have rather limited circulation and do not generally get the professional attention they deserve because of inadequate local research facilities and staff. Thus, to achieve adequate progress in the dissemination of Bank research results in developing countries, it would seem necessary to build up the role of the Bank in the area of technical assistance designed to build up research capabilities in developing countries. It may be desirable to begin by a general survey of the existing situation and actual needs in this field, followed by a comprehensive program in which the role of the Bank would be clearly defined and supported by adequate resources.

Another step which could improve the dissemination of information from the Bank would be to enlarge the list of institutions and agencies receiving Bank publications. Universities, relevant government ministries and departments and national and regional development institutions should all be included.

Another suggestion in this regard is for the Bank to organize regional seminars and working groups in cooperation with regional organizations and agencies. The general objectives of such seminars should be to focus attention on the development problems and needs of each region selected and the role of economic research in helping to identify these problems, as well as to make suggestions for their solutions where appropriate. This suggestion can help mobilize the research staff and agencies in the developing countries and promote contacts between them. It can also increase the role of the Bank as a promoter of economic research in developing countries.

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REPORT OF THE

RESEARCH REVIEW PANEL:

ENERGY, WATER AND TELECOMMUNICATIONS

May 10, 1979

Report of Research Review Panel
Energy, Water and Telecommunications

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REPORT OF REVIEW PANEL

Energy, Water and Telecommunications

I. INTRODUCTION

The Review Panel, appointed in 1978, consisted of the following members:

Mr. M. Boiteux (Chairman)	President Electricité de France
Prof. A. R. Prest	Professor of Economics London School of Economics
Mr. Romulo Furtado	Secretary General Ministry of Communications Brazil
Mr. A. K. Roy	Sanitary Engineer SEARO, WHO
Mr. Lambert Konan	Director General Energie Electrique de la Cote d'Ivoire

Its terms of reference were as follows:

It is intended that a review of the research program of the Energy, Water and Telecommunications Department over the period 1972 to 1978 should be conducted by a high level panel of experts from outside the Bank. In light of the overall objectives of the Bank's Research Program, the general questions to be addressed by the panel will concern:

(a) choice of research topics;

(b) the way in which the research has been conducted;

(c) operational relevance of the results; and

(d) lessons for future research efforts.

It was further understood that these terms of reference should be interpreted in the light of the objectives of the Bank's Research Program, i.e.:

(a) to support all aspects of Bank operations, including the assessment of development progress in member countries;

(b) to broaden our understanding of the development process;

(c) to improve the Bank's capacity to give policy advice to its members; and

(d) to assist in developing indigenous research capacity in member countries.

The panel met in Washington DC from October 17-19, 1978 and from February 12-15, 1979. Its report was finalized in February, 1979. A representative of the panel attended a regional seminar on power tariff policy in Indonesia in January, 1979, in order to gain some knowledge of the fieldwork side. All the members of the panel would like to express their deep appreciation of the help given by Mr. Y. Rovani, Director of EWT, and Messrs. J.J. Warford, Economic Adviser, EWT and M. Munasinghe, Economist, EWT, who acted as panel secretaries, as well as many other members of the Bank staff, both inside and outside the Department. Without their help and guidance, this report could simply not have been written.

Section II briefly describes the role and functions of EWT, and then continues with an appraisal of its research work in recent years; Section III is concerned with suggestions for the future orientation of research; Section IV brings together our recommendations. Annexes list the research projects undertaken in the period 1972-78, the details of our proposals for the future and appraisals by panel members of the work in the four main fields covered by the Department, i.e., energy; power; water and sanitation; and telecommunications.

II. EWT RESEARCH WORK IN RECENT YEARS

Role and Functions of EWT

The EWT Department evolved from the former Public Utilities Department of the Bank, the change in title being a recognition not only of the expanding role of the Department in lending operations but also of the widening range of the analysis of projects in the traditional utility sectors. In a department which has and should have very close ties with the operational requirements of the regional divisions, it is inevitable that what might be thought in a purely academic context to be research should coalesce with the functions of interpreting ideas and imparting knowledge to others. This is all the more so in that the Department has specific responsibility for operational aspects of telecommunications and petroleum. It follows, therefore, that we regard it as our duty to examine the research activities of the Department, when interpreted in a broad, rather than a narrow, sense.

We note that total research expenditure in EWT, whether Research Committee approved, or not, amounted to some 8.5% of Bank research expenditure over the period FYs75-78. We also note that the share of EWT in approved loans and credits in FYs74-78 was quite considerably larger, at 20.4%, a figure which may itself increase in the not too distant future. We understand that in FYs75-78 the actual EWT research expenditure percentage was greater than that originally envisaged, which we interpret to mean that this department was able to plan and execute good research projects during this period. At the same time, the areas on which attention is focussed in EWT are not ones which occupy a great deal of time in DPS and so there is very little overlap or duplication in this respect. All of this suggests to us that the research activities of this department have been thriving in recent years. This does not mean, however, that there is already a large body of people spending their time on research. We are informed that there is no single member of staff who is engaged on research full-time and that out of 39 professional staff in the Department, only 2 ½ staff years is devoted to research.

Research Origins

Part of the research undertaken by the EWT Department (e.g., rural water supply, rural electrification and pricing work) was initiated shortly before or immediately after the reorganization of 1972, and arose from discussions connected with the preparation of Bank Sector Working Papers in Power, Water and Telecommunications, prepared by the predecessor of the EWT Department (i.e., the Public Utilities Projects Department, which was operational at the time). Also the water appropriate technology project was developed by staff directly after assignment to the EWT Department from the region.

Since reorganization, research ideas have been developed mainly within EWT by staff who had substantial and recent operating experience. These ideas were related to a variety of stimuli including: (a) new policy directions from management (rural and appropriate technology work); (b) suggestions by Bank borrowers or outside professionals (studies on telecommunications in Papua-New Guinea and rural electrication in Liberia); (c) outside events such as the 1973

oil price increase (study on assessment of petroleum prospects of certain LDC's). On the other hand, telecommunications pricing and investment research developed from within EWT. Much of the effort in the energy sector stemmed from the anticipation of the needs of Bank management for information necessary to determine lending strategy in this sector e.g., energy supply-demand outlook, higher energy costs, and most recently, a survey of petroleum exploration-status and prospects in Non-Opec LDC's (BEICIP), or management requests, e.g., status and prospects for petroleum lending policy and also energy background papers for the World Development Report II (not reviewed by the panel). Whatever the origins of the research, we conclude that any praise (or criticism) of the development of research topics must be placed at the door of the Department.

Fields of Study

Annex 1 of this report lists 31 research projects which have been undertaken during the period under review. As can readily be seen, they have a wide spread of coverage of fields; and the content ranges from the abstract theoretical to the severely practical.

If one looks at the time-distribution of this work, some fairly clear trends are discernible. Whereas in earlier years the main concentration was on public utility pricing principles and investment appraisal, interest has broadened in a number of ways recently. One development has been that considerations of cost minimization have led to more intensive study of alternative technologies, e.g., in water and waste disposal and in the trade-off between costs of electricity supply and its reliability. Another has been in the extension of public utility provision (electricity, water) from urban to rural areas, a change of emphasis which is partly, though not wholly, related to increased interest in the provision of such facilities for the poorer members of society. Yet another development of major importance has been increased emphasis on energy problems, raising such issues as the examination of the oil and gas potential of oil importing LDC's. It is important to recognize that there have been these major shifts of emphasis in the Department during the period under review.

Areas of Major Concentration

The first point is that the research of the Department has not been in the mould of much of today's work in economics, in the sense of constructing large scale models of the economy and/or elaborate econometric exercises. Research in the Department has been much more a matter of fitting individual non-standardized nuts and bolts together rather than constructing the eighth wonder of the world.

Within the area of public utility economics, there has been much more concentration on marginal cost pricing principles than on cost-benefit analysis. This has partly been a matter of emphasizing the need for a pricing system which had analytical justification rather than one based on the totally meaningless calculations of bookkeepers. But there has been another reason too. However much one might wish to appraise all investment decisions on cost-benefit lines, the simple truth is that it is quite extra-ordinarily difficult to find any surrogates for benefits in this area. We

are impressed by the efforts of the Department to investigate these matters, e.g., by looking into the possibilities of measuring drinking water supply benefits by health improvements or public utility improvements generally by increases in land values; but we are convinced by the failure of these attempts that there simply is no golden key to unlock these mysteries, and no useful purpose is served by pretending otherwise.

But as a number of department papers have emphasized (see The Definition and Role of Marginal Cost in Public Utility Pricing, Staff Working Paper 259, May 1977), the inability to develop utility criteria for investment decisions does not imply an absence of pricing criteria. It has been a well known feature of public utility economics for a long time that one could think in terms of either a short-run marginal cost approach to current output decisions plus a separate investment criterion, or a form of marginal cost pricing which incorporates capital costs in some way. What the Department has been at pains to emphasize is that if one takes an appropriate version of the second approach (average incremental cost pricing, in its terminology), one can get a reasonable test of investment decisions by this means--in the sense that if this method of pricing is used and there is excess demand, then there is a general indication that the size of the plant should be increased.

Nor does the absence of any convincing measurements of benefits mean that nothing can be said about plant design. The major study into water and waste disposal has brought out very clearly that the differences in annual costs per household between high-cost methods of total disposal and low-cost methods of partial disposal (of the order of 20:1 on one measurement) provide ample room for discussion about investment choice, even in the absence of more refined information.

At the same time we should record our view that there is scope for further consideration of the precise way in which charges should best be levied for particular types of services. The point is made in Financing and Evaluation of Sewerage Projects (Public Utility Report GAS 13 of 18.2.77) that there are four methods of recovering sewerage provision costs:

Periodic charges on householders based on, e.g., property value;
Surcharges on water supply charges;
General revenue;
Benefit taxation, e.g., special assessment or land value increment taxation.

Our view--which will be elaborated in Section III--is that there is scope for more work in considering the relative merits of these alternatives, and not only in the sewerage field.

Given that estimation of the economic benefits of investment decisions has not been a central part of the Department's work, it follows that socially weighted benefit calculations have not been prominent either. At the same time, attention has been paid to the idea of "lifeline" supplies, i.e., the provision of limited quantities of water, electricity, etc., at low prices; the opposite of the usual declining block tariff arrangement.

We shall have some further comments to make on such ideas in Section III, but simply observe now that social pricing of this kind has not been neglected.

Another point to be noted is that the Department has from time to time made in-depth investigations into the state of knowledge in certain fields. A good example is the survey of low-cost technologies in water and waste disposal. This is another subject to which we shall return.

The Quality of the Research

Any assessment of research quality in general terms must of necessity be very subjective in the social sciences. One can ask leading questions about the originality of one contribution or the acceptability of another for publication, but in the end a great deal of individual judgment is involved. Our own overall view about EWT research is a favorable one. Some of the work has been published in book form by the Bank (e.g., Saunders & Warford, Village Water Supply - Economics & Policy in the Developing World; Turvey & Anderson, Electricity Economics - Essays & Case Studies), but it is our view that such works would have been readily accepted by commercial publishers. This is supported by the favorable reviews afforded to them (see, for instance, Journal of Economic Literature, December 1977, and Land Economics, February 1978, on the first; and Journal of Public Economics, October 1978, on the second). Many of the papers issued by the Department show a highly commendable acquaintance with developments in the literature and an ability to focus on the aspects most relevant for Bank purposes. For instance, the discussion in Working Paper 259 op.cit.of four concepts of marginal cost--two textbook versions, the present value of incremental cost approach and the average incremental cost one--together with the simulation exercises comparing the different versions is an extremely thoughtful exposition and a model of discerning judgment on the choice between the alternatives.

Naturally, there were particular aspects of particular projects which drew criticism from the relevant experts on the Panel. These observations are to be found in the technical annexes.

It should also be recorded that there has been a sensible and catholic choice of consultants for helping the Department in its work. It may often be that consultants from developed countries have a higher level of technical expertise and can discharge their duties more expeditiously, but those from less developed countries may benefit from the training and also have a most important role to play in helping to disseminate ideas in their own countries. The Department has been very much aware of these pros and cons and has tried hard to get a best of both worlds solution.

Relevance to Bank Lending

A number of examples testify to the infiltration of economic analysis into Bank lending to public utility organizations. In the power area, we understand that whereas in only 4 out of 10 projects receiving approval in FY73 was mention made of marginal cost pricing, the corresponding figure for FY78

was 18 out of 18. Similarly, in FY77 all 14 water projects receiving approval embodied these principles. Similar examples can be given about individual countries. One example we encountered was that whereas in power projects in Thailand, cost recovery was the only consideration in 1969, the abolition of subsidies and the construction of a tariff on marginal cost lines was paramount in 1977. In short, we can say that EWT has performed the task of translating general pricing principles into forms suitable for incorporation in practical decision-taking and thereby introduced a far more rational base for such operations. If these principles have sometimes had less effect in influencing the thinking of members of regional departments than they should have done, this is not basically a deficiency of the work of EWT.

Dissemination

Dissemination inside the Bank has been helped appreciably by the document series initiated by the Department in 1973. Since then the following books and papers have been or are about to be published:

World Bank Research Publications	10
Books	3
Policy Paper	1
Reports	3
Staff Working Papers	3

EWT Department Reports	70
Research Series	14
Guideline Series	15
Public Utilities Notes	41

together with a number of other miscellaneous research papers. We regard this as an admirable exercise in that the Department's thoughts are made available at an early stage, thus informing other people of new developments and enabling them to make comments if they so want before views are too firmly crystallized.

As far as dissemination outside the Bank is concerned, there have been many seminars on pricing policy, such as the one in Indonesia in January 1979. The objective of much of this work is to encourage borrowers, with Bank guidance, to conduct their own tariff analysis based upon marginal cost principles but with systematic recognition of local economic and social objectives and constraints rather than, as is often the case, simply relying upon a traditional public utility approach to tariff policy put forward by foreign consulting firms. Technology seminars and meetings with relevant professional bodies have also been frequent, e.g., the World Bank Seminar on Sanitation Project Planning in London in December 1978 when discussions were held at the Institute of Civil Engineers on rural water supply, urban water distribution, excreta disposal, sanitation alternatives, water supply and health, the role of economic assessments in such matters, and so on. Some of these meetings have been in developed countries but the great majority have been in LDC's.

The members of the panel from LDC's also collected some information of their own about the impact in their own countries of the economic principles elaborated by the Bank. The crucial point seems to be that communication has to take place with the right people. Conferences, for instance, need to be aimed both at people currently enjoying administrative

responsibility and at the younger executives who will subsequently make their mark in public utility operations in developing countries. Publication of books or distribution of discussion papers by the Bank is a necessary but not a sufficient condition for effective dissemination. More specific methods of inculcating ideas need to be adopted to make any marked impact.

Perhaps the best indication of the effectiveness of the World Bank's efforts is that marginal cost pricing principles in water and electricity supply are more often known in LDC's than in the USA.

III. Future Research

Introduction

In sketching a program for future research, we cannot start in vacuo but must bear in mind all the time the particular skills already available in the Department, the comparative advantages of EWT relative to other departments in the Bank, the research guidelines supplied to us, and so on. Quite apart from recognizing these constraints, we must also beware of a number of other considerations. The first is that the problems of the developing world do not stand still over time; nor does the subject of economics. So whatever we think may be appropriate in the way of research at present may be much less so in a few years' time. This in turn implies that one needs to think of some mechanism for ensuring that research topics and techniques respond over time to changing commitments. It would after all be the height of irony that a department concerned with appropriate technologies should itself use inappropriate methodology in investigating these choices. We shall return to this point later.

Two further observations need to be made. One is that good basic research is not something which can be produced to order; anyone who protests that it can is a fool or a knave or both. All that we, or anyone else, can do is to make general suggestions which may or may not bear fruit in the shape of original or illuminating research work. Furthermore, we do not subscribe to the proposition that the quantity of paper resulting from a research project is a meaningful indicator of its quality. The second observation is that we have to be a little careful about the proposition that all worthwhile research must be of a multi-disciplinary character. Whilst fully recognizing that inputs are needed from a variety of disciplines in many research projects one has to be careful that this does not lead to a lowering of standards all round.

With these general observations behind us, we shall now examine a series of suggestions about future EWT research and express tentative judgements about their importance. Then we shall say something aobut research organization. Finally, we shall come to our overall conclusions.

Proposed Research Program

A large number of suggestions were made to us by the Department. We rejected some on the grounds that they did not fall within our concept of research; and others because we did not think them appropriate for EWT. Of the remainder, we accepted some more or less as proposed but we scaled others down quite considerably. So what follows is a program for the immediate future

agreed by the panel after considerable discussion. Those projects deserving the highest priority are marked with an asterisk. Further details of the proposals are given in Annex 2.

(i) Energy: General

We feel that there is here a new field of major importance and that the Department has very considerable comparative advantages in studying it. The following topics are extremely important, badly in need of further work and highly appropriate for the Department to concentrate on:

LDC energy outlook (annual consideration of energy developments);
* Energy and development (interrelation of energy consumption and development;
Energy demand management and conservation (possible savings and the means of effecting them);
Non-conventional energy (better utilization of traditional sources such as firewood and examination of new ones such as solar heating).

We make these recommendations in full recognition of the existing division of labor in the Bank, on energy research between EWT and DPS. We have in fact studied the energy research of DPS and have commented on it in Annex 3. Given the continuance of the present division of labor we do not, for instance, suggest that EWT should do work on the world energy outlook. But if all Bank applied energy research on both the supply and the demand sides were to be concentrated in EWT at some future date, we should recommend that topics of that kind be then added to this program.

The above recommendations would absorb some 64 staff-weeks and 40 consultant-weeks of time per annum initially (all subsequent figures of manpower should be interpreted as initial requirements).

(ii) Energy: Oil and Gas

Many of the remarks under (i) apply in this case too. Two particular subjects seemed to us to have priority. They were:

* Natural gas issues (e.g., flaring of natural gas and potential domestic markets for gas in LDC's);
Inter-fuel substitution (appraisal of substitution possibilities).

The resources involved would be 8 staff-weeks and 35 consultant-weeks per annum.

(iii) Energy: Electric Power

This area, unlike the two previous ones, has been a mainstay in the Department for a long time. However, there are still a number of issues which call for further research effort. We suggest the following:

* Standards of rural electrification (appropriate engineering standards for rural systems);
* Power pricing seminars (dissemination of power tariff pricing principles);
* Power/energy pricing (optimum energy pricing policies);
Autogeneration, cogeneration, technology monitoring, methods of power supply to remote areas (small pilot type studies in each of these fields);

Energy transmission costs (case studies for electric power, gas, etc.). It is estimated that 64 staff-weeks and 77 consultant-weeks per annum would be needed.

(iv) Water Supply and Sewerage

Like electric power this has been a staple part of EWT activity in the past. Some of our recommendations spring directly from this previous work.

* Technology dissemination (communication of the outcome of the major recent investigation into water supply and waste disposal technology).
* Follow-up research on technology (e.g., methods of reducing water consumption).
* Resource recovery (technical and economic evaluation of the major reuse technologies).

Multicity and multipurpose projects (special problem of water supply, etc., when it is not confined to one city or one purpose). Fifty four staff-weeks and 102 consultant-weeks per annum would be involved.

(v) Telecommunications

We are still of the opinion that in the past this area has not received the research attention which it justifies. We should like to commend two research areas:

* Nature and characteristics of telephone usage (analysis of telephone usage; transport usage/telephone usage tradeoffs);
* Pricing policy (e.g., pricing issues raised by decreasing costs).

Thirty six staff-weeks and 88 consultant-weeks per annum would be needed.

(vi) Multisector Studies

We endorse the following proposals which have been made:

* Alternative financing of infrastructure (financing by local property tax, drainage levies and land betterment taxation);

Asset revaluation (incorporation of appropriate principles of asset revaluation in public utility operation in LDCs);
Appropriate institutions for decentralized services (e.g., should one authority be responsible for all utilities in a local area?)
Twenty-four staff-weeks and 31 consultant-weeks per annum would be involved.

The overall resource total of these recommendations is 250 staff-weeks and 373 consultant-weeks per annum. We shall come back to the significance of these figures later.

Later Research Developments

The topics listed above are those to which we give priority in the next year or two. However, there are a number of possible later developments to which we should like to draw attention. These ideas could be pursued after the immediate priorties have been taken care of. Reference is made to some

of these in the technical annexes but it may be helpful here to illustrate them by reference to multisector topics. As will be seen, the multisector proposals we have endorsed above represent only a small part of the potential fields of enquiry.

(i) Public Finance Aspects

There are two areas here which we deem to be of importance. The first is to emphasize that charging mechanisms which lead to surpluses of revenue over costs have a great deal to be said for them in developing countries. For instance, when there is a situation of excess demand in the face of charges on a marginal cost basis, as appears to be the position with telephone systems in a number of countries, there may well be a case for increasing charges so as to eliminate excess demand and generate much larger surpluses than at present. We say "may well be" as we are acutely aware that at present there is a veil of ignorance over the character of consumers, the part played by telephone communications in economic development and so on. That is a primary reason why we recommend expansion of research in the telecommunications field.

The second public finance area is investigation of the effectiveness and effects of different methods of levying charges on consumers. It is a standard approach to charge for public utility supplies by reference to amounts consumed. But there may well be arguments of administration and equity for considering other methods in whole or partial substitution. Thus a system of charging property owners for water and sewerage improvements has a lot of points in its favor. One is that effective charges for water consumption (taking account of those leakages which owe more to human ingenuity than to defective water mains and the like) may be very difficult, or prohibitively expensive to enforce. Another is that water and other site-specific improvements such as sewerage must be expected to work themselves through into property values via increases in rents. Very similar points apply in rural electrification where one is liable to have a considerable excess of average cost over marginal cost in the initial stages. Even though it may not be possible to capture all the benefits accruing to property owners by this route at the very least cost of utility provision could be recovered.

One or two other ideas have been put forward in this area. One is that the argument that property owners would experience cash flow difficulties in meeting such charges could be met by allowing deferment (with interest) until the property is sold or otherwise transferred. Another is that schemes of this sort may be a vehicle for self-help - in the sense that if a large proportion of the property owners in a given area voluntarily agree to ask the authorities for help in making such improvements, this is an unambiguous gain to all concerned.

We do not assert that research should necessarily be oriented towards this particular charging device. There are clearly other alternatives (e.g. additions to annual property taxes) with differing merits and demerits. What we are saying is that there is a case for investigating in depth a whole variety of methods of cost recovery.

(ii) Inflation Accounting

Another financial problem is that of the appropriate system of public utility pricing under conditions of 'permanent' inflation. There are at least three separate issues. One is the pricing of fixed capital costs. It may or may not be necessary to think in terms of replacement costs, depending on the exact way in which plant costs enter into the charging process e.g. in so far as they only enter on an incremental basis, this automatically takes care of inflation. Inventory accounting is another problem - LIFO v. FIFO methods et hoc omne - but its importance clearly depends on how long stocks are normally held by public utilities and how rapid is the rate of inflation. The third component is capital gains (losses) arising from decreases in the real value of monetary liabilities (assets). It may be the case that none of these three elements is of critical importance for public sector pricing but it is, to say the least, worth trying to find out.

(iii) Data Collection and Organization

Although we do not see a primary role for extensive data collection analogous to the ideas put forward by the Panel on Income Distribution and Employment, we nevertheless feel that the EWT Department has a role to play in acting as a storehouse and centre for classification for selected subjects. There has already been a very useful exercise in surveying low cost water disposal technologies; and similarly in the sampling survey of rural household electricity consumption in El Salvador. It is for this reason that, as already explained, it would be an important contribution to knowledge to conduct a similar major survey using both qualitative and quantitative evidence of telephone usage in some selected LDCs.

In addition to collection of new data in specific cases of this sort, we feel that, as is now proposed, better use might be made of existing data which the Department presently has, by organizing and classifying this information, and making it available to operational staff, borrowers and researchers. In particular a good starting point could be effectiveness of particular public utility charging schemes which have been recommended by the Department, and the systematic consideration of the sorts of pricing techniques most relevant for countries at different stages of development (e.g., is it appropriate that country y, a laggard in the development process, should adopt the system operating today in country x - a country which is well ahead of country y - or that operating 20 years ago in country x?)

(iv) Social Pricing

We recognize the necessity of paying adequate attention to the social aspects of public utility pricing but nevertheless have some reservations about the likely distributional advantages of 'lifeline' pricing or increasing block tariffs. First of all, there seems to be no very good reason for singling out one group of poor people rather than another. And in any event with telecommunications it is difficult to construct sensible tariffs discriminating between, say, urban and rural poor. Second, it is all too easy to assume that poverty relief is synonymous with income redistribution; this may or may not be the case depending on which other groups gain or lose in the process. Thus a 'lifeline' system might work in such a way that the poor gained, the middle

income groups lost and the rich gained, even if total consumption of the utility remained unchanged. And once the possibilities of output changes are taken into account there are unlimited consequences for income distribution depending on, for instance, the relative distribution of pre-tax incomes generated by the industries which grow and contract.

We must also revert to our earlier point that improvements in public utility provisions may increase property values. If so, we could have a situation where people at low income levels may gain through cheap electricity, water or whatever, but lose through rent increases. Finally, it is an old story that once subsidization of particular interests begins, it is virtually impossible to remove it and almost as difficult to prevent it from spreading.

The fact that we deem it difficult to pin down the distributional benefits of social pricing in the public utility area does not mean that we think them unworthy of research. Quite the contrary. There clearly is a case for some sustained thinking about such matters to see whether the 'lifeline' systems referred to in the Department's papers can really be justified on distributional grounds.

(v) Benefit Calculations

We saw earlier that the Department has not been able to make much headway in the estimation of benefits. There may be possibilities here for further investigation of benefits flowing from telecommunications provision or different sanitation schemes, but we cannot really see that there is much likelihood that even extensive research by EWT is going to add much to knowledge in this area. This does not mean that there is no scope for research into benefits construed in a much more general way but rather that any such investigations would fall outside the province of EWT.

(vi) Institution Building

Although we fully recognize that the particular structure developed in one country will be unlikely to suit the traditions and political conditions of another country, we nevertheless think that the Bank has a most important role to play in setting out appropriate principles for the efficient management, pricing policies and investment policies of public utilities in very different countries. This is why, for instance, we strongly endorse the existing efforts and new proposals for electric power dissemination seminars, the issue of guidelines relating to sewerage technology and the investigation of appropriate institutions for decentralized services.

Research Implementation

An appropriate organization is not a sufficient condition for the generation of high quality research but it may be a necessary one. We shall divide our comments into three categories: those relating to matters inside EWT, those involving EWT and other Bank departments and those relating EWT to borrowing countries.

Inside EWT, we have two points to make. The first is that there are very close links between research studies in oil, gas and electricity and the organization of research in the Department should reflect this connection. Secondly, we saw earlier that there is no one person who spends all his time on research.

We wonder whether there is a case for staff members spending periods of, say, a year fully on research alternating with periods fully assigned to other duties. It may be that the nature of the department's work does not permit such a clean-cut division but it is one which has been found immensely useful in different universities in different parts of the world.

Relations between EWT and other parts of the Bank could be improved in a variety of ways. The most important is that much more research impetus ought to come from the regions. Perhaps the process of operational requirements giving rise to research proposals would be helped if there were more formal and more regular meetings between regions and the appropriate members of EWT. But we suspect the the root cause may well lie in the pressure of operational work and the lack of opportunity to think about the research implications of operational requirements long enough or deeply enough. Whatever the precise cause, we feel confident that this is a matter requiring attention in the regions rather than in EWT.

Although the regional relationship is the most important point, it is not the only one. We were surprised to find a relative absence of joint research between departments. We find it hard to believe that more issues do not arise which are of common interest to EWT and say, Transport or Agriculture. We recognize that collaborative efforts already take place, e.g., the feedback from EWT to irrigation water charges policy paper, inter-departmental steering committees and review groups, etc. But we think that the quality of research all round would be improved by still more collaboration. The same argument does not apply nearly so much to relationships between DPS and EWT but there are areas, pre-eminently energy, where as already discussed in the Proposed Research Program there is scope for more clear cut division of labor and/or possibly fuller integration than has been evident in the past.

When we turn to EWT in relation to borrowing countries, there seems to be less amiss than with relations inside the Bank. We were impressed with the very real efforts made to communicate research findings to the relevant people in other countries and we fully endorse the present and proposed methods of communicating this intelligence. There are one or two suggestions for improvement (e.g. regular circulation among interested parties of the lists of documents by EWT, on-the-job training for LDC personnel through exchange programs with developed countries and more cooperation with other international agencies) but these are marginal developments only. We approve of one recent innovation, in which a staff member of a borrowing power authority worked in the Bank for 3 months in order to familiarize herself with Bank policy toward power tariffs. One small point might be made, however, and this is really one of internal Bank organization. We were informed that dissemination is impeded by the very long time taken for the translation of research findings into French or Spanish. Anything which could be done to speed up this process would clearly be desirable.

Conclusions

Our overall recommendations can be most readily appreciated if expressed in tabular form:

Research Manpower

	FY74-78 (av.)		Proposed	
	Staff (weeks p.a.)	Consultant (weeks p.a.)	Staff (weeks p.a.)	Consultant (weeks p.a.)
Energy (general plus oil and gas	15 (16%)	27 (10%)	72 (28%)	75 (20%)
Electric Power	54 (56%)	92 (35%)	64 (26%)	77 (21%)
Water & Sewerage	17 (17%)	141 (53%)	54 (22%)	102 (27%)
Telecommunications	11 (11%)	6 (2%)	36 (14%)	88 (24%)
Multisector	nil(0%)	nil(0%)	24 (10%)	31 (8%)
Total	97 (100%)	266 (100%)	250 (100%)	373 (100%)

It can be seen that, on a 40 weeks per annum basis, it is proposed that the staff complement be increased from about 2 ½ person years to almost 6 ½; and consultant employment from 6 ½ to almost 9 ½.

Several points need to be made about these recommendations. The first is to remember that we are defining research in the broad sense of including dissemination and related activities as well as research study, strictu sensu. Given the scale of future Bank lending in these fields, we do not regard the research effort proposed as anything other than modest. The second is that although there is an approximate two and a half fold increase of staff the increase in consultant time is less than 50%. We deem it to be an advantage to place the greater weight on the expansion of the permanent staff; and we conclude that research funding would not increase in anything like the same proporation as staff time. Nor should we regard it as too difficult for the Department to absorb this increase in permanent staff, since much of the additional research time would be taken up initially in mastering the literature and developing research skills. Thirdly, the expansion suggested owes a lot to the development of energy studies. The percentage increase in both staff and consultant time would be markedly less were it not for this fact. But we regard energy as a very special case entirely justified by the dramatic changes in the importance of this subject in recent years. It should also be noted that the expansion of research narrowly defined is less than the overall percentage figure because of the increased emphasis on dissemination. Finally, it will be seen that there are some important changes in the percentage distribution of staff and consultant time, e.g., a substantial fall in electric power consultancy time and a substantial increase in that for telecommunications.

To conclude, we feel that the research activities of the department have been understaffed in the past, its previous record shows that it is very capable of turning out very worthwhile research and that there is a whole string of important projects awaiting investigation in the near future.

IV. RECOMMENDATIONS

In view of the Department's record and performance to date and potentialities for the future, we recommend:

(1) An expansion of the Department's research staff from the current very low level of the equivalent of 2½ person years per annum to, say, the equivalent of 6½ person years in the first instance, this figure to be reviewed after experience has been gained of operating at this expanded level. Consultant capacity should be increased from 6½ to 9½ per annum.

(2) There are strong grounds for expanding activity in the area of oil and gas, etc., and, to a lesser extent, in telecommunications.

(3) Items such as rural electrification and the dissemination of power pricing and water/sewerage technology will necessitate some expansion.

4. Guidelines for later research are as follows:

   a. New methods of charging, their practicality and their advantages, need to be explored in depth.

   b. Public utility pricing under conditions of inflation needs to be investigated in LDCs.

   c. The Department could play a useful role in organizing existing data and gathering new information in selected cases.

   d. Research into social pricing is necessary to determine the exact implications for income redistribution.

   e. We do not see a great deal of scope for work in benefit calculations.

   f. Institution building must continue to be of major concern.

5. EWT internal organization needs to be re-examined with an eye on the further integration of power work with other energy work; and on allowing staff to have longer periods of full time research.

6. We hope that methods can be evolved to generate more research stimulation from the regions. We should also like to see more inter-sectoral research collaboration between EWT and other departments, and a more clear cut allocation of responsibilities for energy research.

7. Some improvements might be made in the process of communicating research results overseas, and collaborating with other relevant agencies.

EWT RESEARCH PROJECTS 1972-78

Energy (General Plus Oil and Gas)

Oil and Gas Potential of Oil-Importing Developing Countries
An Approach to Planning and Implementing Rural Energy Projects
(Report on Pilot Exercise in Colombia)
Energy Demand Forecasting: A Critical Review of Current Approaches
Energy Supply-Demand Forecasting: A Critical Review of Current Approaches
Energy Supply-Demand Outlook, 1980-85
Potential of Non-Conventional Energy Sources for Northeast Brazil and a Recommended Research and Development Program
Use of Solar Water Heaters in India
Energy for Development
Coal: State of the Art
An Assessment of the Petroleum Prospects of Certain Developing Nations
Dominant Issues in Nuclear Safety

Electric Power

Analysis of Problems and Issues in Village Electrification
Pricing and Investment in Electricity Supply
Standards of Reliability of Urban Electricity Supply
Sectorial Adjustments to Higher Energy Costs-Power
Public Utility Pricing and Investment(including water supply component)
Rural Electrification in Liberia

Water and Sewerage

Village Water Supply
Appropriate Technology for Water Supply and Waste Disposal
Design of Low Cost Water Distribution Systems
Rural Water Supply
Wastewater Reuse (Agricultural and Industrial)
Fabrication of PVC Well Screens
Pipelines
Reduction of Unaccounted for Water
Domestic Water Meters
Reduction in Waste Water from Public Hydrants
Testing of Wood Bearings for Hand Pumps
Measurement of the Health Benefits of Investments in Water Supply
A Hand Pump for Rural Areas of Developing Countries

Telecommunications

Pricing and Investment in Telecommunications
Economics of Telecommunications in Papua New Guinea

PROPOSED RESEARCH PROGRAM

Note: It should be fully understood that these figures are no more than rough approximations and that they relate to the scale of activity in the initial years.
*=Priority Project

STAFF REQUIREMENTS

Project	Weeks per annum: Staff	Consultants
Energy: General		
LDC energy outlook	25	Nil
*Energy and development	10	40
Energy demand management conservation	5	Nil
Non-conventional energy	24	Nil
Sub-total	64	40
Energy: Oil and Gas		
*Natural gas issues	3	20
Interfuel substitution	5	15
Sub-total	8	35
Energy: Electric Power		
*Standards of rural electrification	12	25
*Power pricing dissemination	20	Nil
*Power-energy pricing	20	24
Autogeneration, cogeneration monitoring technology and remote area power supplies	8	16
Energy transmission costs	4	12
Sub-total	64	77
Water Supply and Sewerage		
*Technology dissemination	24	36
*Technology follow up research	6	24
*Resource recovery	18	36
Multicity and multipurpose projects	6	6
Sub-total	54	102

Project	Staff	Consultants
Telecommunications		
*Nature and characteristics of telephone usage	20	60
*Pricing	16	28
Sub-total	36	88
Multisector		
Alternative financing of infrastructure	9	12
*Asset revaluation	6	10
Appropriate institutions	9	9
Sub-total	24	31
Total	250	373

BRIEF DESCRIPTION OF RESEARCH TOPICS

I Energy: General

a. LDC Energy Outlook

This will be an annual update of energy developments in LDCs. It will become increasingly a country-by-country report with a summary discussion on aggregate supply/demand/trade outlook, development issues and policy questions.

*b. Energy and Development

This will be a sustained effort to gain a better understanding of the interrelation of energy and development. During the first year an attempt will be made to carry out a comparative analysis of energy consumption patterns of some five to six LDCs with a view to interpret the reasons for differences among them. (A similar study was carried out by Resources for the Future on OECD countries which proved very illuminating.)

c. Energy Demand Management and Conservation

The potential for action in this area in LDCs needs to be examined more systematically. Possible savings of energy in industry, transport, agricultural mechanization, commercial and residential buildings, cooking, etc., should be investigated. Institutional, fiscal and other incentives needed to encourage conservation and efficiency in LDCs should be identified.

d. Traditional and Non-conventional Energy

This includes work on the better identification and utilization of both traditional energy sources (firewood, agricultural wastes, windmills, small hydro, solar dryer, etc.) and newer renewable resources (solar heating or cooking, solar pumping, solar electric, etc.). Much of the work is to be done in and with the participation of LDCs and financed as components of Bank loans for rural development, forestry and science and technology--the UNDP may also be a source of finance. Study will be closely coordinated with research project III d (decentralized energy sources for remote areas).

II. Energy: Oil and Gas

*a. Natural Gas Issues

Many LDCs are currently flaring associated gas and not using existing non-associated gas. In addition, other countries may be facing these problems in the future. A better understanding of the potential domestic markets for natural gas in LDCs and the economics of this resource in itself and in relation to substitutes is desirable.

b. Inter-fuel Substitution

A systematic review of substitution possibilities and associated technical, economic, environmental and other problems is desirable to improve our capabilities in the area of demand management, energy pricing and appraisal of industrial and other energy-using projects in agriculture or transportation.

III. Energy: Electric Power

*a. Standards of Rural Electrification

The power lending program which has averaged around $900 million per year over the period 1974-78, will increase to a level of about $1.5 billion during the next five years. The fraction of power loans devoted to rural electrification (RE) has increased from a very small level prior to 1974, to approximately 5 percent in the last five years, and it is estimated that this rising trend will continue, with up to 15-20 percent of total power lending being allocated to RE projects over the period 1979-83.

The Bank (and its borrowers) now routinely hires a variety of engineering consultants to help in the design and analysis of RE networks. However, there are wide variations in engineering practice associated with RE network planning. In some cases, engineering standards originally developed for the electrification of North America and Europe, especially the high load density urban areas, may be inappropriately applied in RE schemes in the developing countries.

Accordingly, this research project seeks to provide the Bank and our borrowers with guidelines for evaluating the engineering standards associated with the planning, design and construction of rural electric transmission and distribution systems in the developing countries, and the impact of different standards on demand and on the benefits of electricity use.

*b. Power Pricing Seminars/Dissemination

These seminars are designed to disseminate the results of past and ongoing work in power pricing. Two pilot seminars of this type have already been held in Thailand (June 25 to July 2, 1978) and Indonesia (January 7-13, 1979). Twelve countries in the East Asia and Pacific, and South Asia regions: Burma, Fiji, Indonesia, Korea, Malaysia, Nepal, Pakistan, Papua New Guinea, Philippines, Singapore, Sri Lanka and Thailand participated.

The main rationale for these seminars was that during the past year, several borrowers in the East Asia and Pacific and South Asia regions have requested technical assistance and advice in power tariff setting. The performance of foreign consultants hired to provide such support has often been unsatisfactory. Furthermore, several borrowers have recently undertaken in-house tariff studies, and others have the capacity to do so, with some external guidance and encouragement. Therefore, a series of two seminars was designed to assist those borrowers who have already undertaken pricing studies, acquaint others with the basic concepts involved, and facilitate the exchange of ideas, with a view to promoting the formation of tariff groups within the various power utilities involved, and reducing undue reliance on foreign consultants. "Learning by doing" would clearly be an important element in this process.

The participants indicated that they were pleased with the seminar results. At the closing sessions it was unanimously agreed that they would organize the power tariff seminar on an annual basis, to exchange ideas and to maintain the momentum and interest built up on the topic within the Asian region. They also resolved that the proceedings of the first two seminars be prepared, and requested the Bank to assume responsibility for this task.

Similar seminars will be organized in the other regions.

*c. Power/Energy Pricing

The primary objective of this research is to develop guidelines for energy pricing similar to the power pricing policy guidelines developed earlier. A general analytical framework for examining optimum energy pricing policies is being developed, followed by several case studies of specific countries to apply and test the methodology empirically.

One case study for Thailand has already been carried out, and the analytical framework is being refined for application in other countries. This program is responsive to the increased Bank activity in the energy area and will also provide valuable inputs to ongoing operational work, energy sector studies, and so on. It is also a logical extension of the power pricing work, and underlines the fact that prices for all fuels and energy sources should be studied in an integrated framework.

d. Autogeneration/Cogeneration, Monitoring Existing and Emerging Technologies, and Remote Area Power Supplies

The research project on autogeneration will include case studies to investigate the incidence, causes, and economic rationale for maintaining captive power plants, particularly for industrial use, in situations where central grid supplied power is available.

Currently, new work on cogeneration is being carried out by other researchers in the industrialized countries, to explore the full range of possibilities for the interchange of electric power and heat between the central power grid and large industrial or commercial firms. The results of such studies would, hopefully, be adaptable to developing countries, and would be fitted into the overall context of the above research on autogeneration.

Monitoring existing and emerging technologies will help the Bank keep abreast of the latest developments in energy technology, including improvements to conventional technologies such as for power generation, as well as the development and applicability of newer ideas such as wind power, solar conversion fuel cells and so on to supplement central grid supply. It will allow the Bank to also provide relevant information to borrowers and advise them in these areas.

An in-depth study will also be made of the alternative methods of supply electric power in remote areas where central grid supply is uneconomic. Both technical and economic aspects will be studied with particular emphasis for uses in rural electrification. This study will be closely coordinated with research project II d (nonconventional energy sources).

e. Energy Transport Costs Comparison

This work will consist of case studies of costs of transmission of power versus transport of gas via pipeline or shipment of coal in several countries, to determine guidelines and issues involved in optimum location of generating stations.

IV. Water Supply and Sewerage

*a. Appropriate Technology/Dissemination

Dissemination and implementation of the results of the Department's largest research project (RPO 671-46) occupies the bulk of the future research effort proposed for the water and wastes subsector. A start has already been made in the production of reports which detail research results and the participation of EWT staff in seminars in the UK, India and Egypt. In addition, the UNDP has agreed to finance the design of several prototype water and sanitation projects over the next 18 months, and an EWT staff member has been seconded to manage that effort. The lessons from these experiences are reflected in the table of staff and consultant time requirements.

Research dissemination includes both written and oral channels. Most of the staff time indicated will go towards finalizing the research manuscripts for publication and supervising consultants who will prepare supporting workshop materials such as visual aids for linguistically diverse audiences. The workshops themselves will be conducted by one, or on occasion two, EWT staff and two to four consultants.

In order to speed the integration of research findings into Bank projects, EWT should provide design assistance to projects early in their project cycles and prepare prototype project components to accompany advanced projects which have a high potential for follow-up loans. One of the important aspects of this work is the promotion of linkages with small industries in the informal sector to locally produce the components of the chosen water and sanitation technologies. Again, the bulk of the work will be carried out by consultants, with EWT staff involved primarily with developing appropriate implementation and monitoring methodologies. Requests from the regions for this type of assistance greatly exceed out capacity to provide it, and the levels suggested in the accompanying table would allow for direct assistance to two to three additional projects per year.

*b. Appropriate Technology Follow-Up Research

Two important avenues for follow-up research have been suggested. The first is the exploration of ways to reduce water consumption and dispose of sullage economically and without sacrificing health objectives. This would involve testing water saving appliances in developing country conditions and monitoring various methods of sullage disposal to determine performance coefficients with respect to soil and climactic conditions, sullage volume and strength, mosquito breeding potential, etc. The second area for follow-up research is in the development of evaluation methodologies for health monitoring, handpump performance and social acceptability. Many agencies have expressed interest in implementing the technologies proposed by RPO 671-46, and a consistent monitoring approach would greatly aid in the learning process of all. The Bank's technical and economic methodologics already are widely accepted and used by consulting firms and other development agencies, and it is felt that the Bank has a comparative advantage in this important area which is a prerequisite to a careful comparative evaluation.

*c. Resource Recovery

The third main area of research--resource recovery from waste--would attempt to provide a comprehensive technical and economic evaluation of the major reuse technologies. The integrated approach to the treatment, disposal and reuse of human, agricultural, and solid wastes has been regarded as having high potential for providing economic and financial benefits which the single-project approach has failed to generate. However, the few economic evaluations of existing reuse schemes have produced widely varying conclusions and have serious methodological faults.

This research project would include a careful economic and technical analysis of reuse technologies as they exist or could be adapted for developing countries. It has the potential to create a new industry which could substantially lower a community's waste disposal costs and produce valuable products ranging from energy to food to pharmaceuticals.

d. Evaluation of Multicity and Multipurpose Projects

An increasing proportion of the subsector's lending is being channeled into multicity projects, sometimes involving over 50 communities through a single loan. In addition, the Department is often called upon to advise on the economic evaluation of multipurpose projects which are initiated by

irrigation or agriculture divisions in addition to those of water and power staff. Both of these areas require further analytical input to insure that sector investments are optimal in their macroeconomic contexts.

The major output of this research would be one or more guidelines for Bank staff working on these projects. Because of this operational orientation, any of the work which is entrusted to consultants must be very closely supervised, and considerable EWT staff input will be required throughout the project. Expenditure of staff time at this stage, however, can yield large benefits in the future as these types of projects become more common.

V. Telecommunications

*a. Nature of Telephone Usage/Users

In order to assist pricing and investment decisions, the nature of telephone usage and users needs to be investigated. This would involve the analysis of telephone traffic and applications for service. It might also entail, inter alia, an examination of communication patterns of business and government offices in two different telephone exchange areas of a city: one with relatively good telephone services and the other with an inadequate quantity of telephones and significant business hour telephone traffic congestion. Another element of the study would consist of an examination of the extent to which messages and information are conveyed by hand or through the use of transport in an urban area in which the demand for telephone services far exceeds supply and in which significant business hour telephone traffic congestion exists. This would be accompanied by an estimation of the costs of the alternative communication modes.

Analysis of the telecommunications needs of various sectors such as education, transportation and agriculture, would aim at ensuring that telecommunications investment programs, and the implied pricing policies, are geared to overall development objectives.

*b. Pricing

Study of pricing policy with special reference to pricing issues raised by economies of scale/decreasing costs, joint cost allocation, and willingness-to-pay of consumers in the presence of supply shortages, congestion and so on.

VI. Multisector

a. Alternative Financing of Intrastructure

Problems have often occurred when water and sewerage sectors' projects have been partly financed from municipal taxation. A research study on the problems and issues raised in financing drainage and other infrastructure projects from municipal property, drainage and betterment taxation would be most helpful to the Bank and its borrowers.

b. Asset Revaluation

Where borrowers are operating under inflationary conditions it is important, particularly for a test of financial performance, that assets be appropriately valued. Business and academic institutions, in making studies on accounting for inflation, have put forward various methods for the revaluation of assets. However, invariably problems arise with out borrowers on the choice of methods to be used. As a guide for both the Bank and its borrowers, it would be invaluable to have a study made of the methods available for the revaluation of EWT sector assets and the issues involved, particularly with reference to developing countries.

c. Appropriate Institutions for Decentralized Services

It is well known that a major problem involved in supplying public services in rural areas (which from a technical point of view have to be physically decentralized) is the determination of the appropriate institutional framework for managing them. This problem is often highlighted in an extreme form in terms of financial viability and poor operation and maintenance. Since managerial capacity is so scarce, it is worthwhile to consider, inter alia, an institutional form in which responsibility for management of local water, sanitation, energy and possibly other services is vested in one local authority. A case-study approach should be used to determine those circumstances in which centralized or decentralized institutions are appropriate, and the form they should take, including financial, managerial, sociological and technical aspects.

ENERGY RESEARCH

1. Scope of analysis

An "official" series of documents was submitted for review in September 1978.

(1)	Dominant issues in nuclear safety 03/74;	(*)
(2)	Prospects for the developing countries 07/74	(..)
(3)	Nuclear power: its significance for the developing world 07/75	(..)
(4)	Non conventional energy sources in North-East Brazil 11/76	(*)
(5)	Energy demand forecasting: a critical review 02/77	(*)
(6)	Minerals and energy in the developing countries 05/77	(..)
(7)	Rural energy projects (Colombia) 01/78.	

We have added on our own initiative a recent study by the Department:

(8)	Energy and development 08/78.	(*)

The Department's list of energy research projects includes a further five topics on which documents were not available to us:

(9)	An assessment of the petroleum prospects of certain developing nations (74);	(*)
(10)	Energy supply-demand outlook (74);	(*)
(11)	Coal: state of the art (74);	(*)
(12)	Oil and gas potential of oil-importing developing countries (76);	(*)
(13)	Use of solar water heaters in India (77)	(*)

II. Status of research

The first point to note is the smallness of the energy research budget:

US$280,000 for 1972 to 1978 -- an average of less than US$50,000 a year. Moreover, US$160,000 of this total went on two projects: (7) and (12); the other eight projects took only US$120,000 (only an average US$15,000 per project).

Energy research accounted for only about 0.5% of the Bank's total research budget (corresponding to the proportion of energy operations in the Bank's loans).

Since the sector performed under the major constraint of a strict limitation on its research budget, what evaluation are we to make of its work?

The overall impression is mostly favorable. Of course, some research projects were not undertaken or were not carried out in sufficient depth, but the main reason lies in the paucity of the financial resources. There can be no question that the best use has been made of a tight budget.

(*) Package of 10 projects comprising the Department's 1972-78 "energy" research program.

(..) Bank publications to which EWT has contributed.

which has been managed efficiently, while the quality of the work is generally high.

III. Choice of topics

In spite of the low volume of resources deployed, a varied program of research has been developed: 10 projects (one-third of the Department's total number of projects) have been taken up, covering a very wide range of concerns. On the other hand, this has involved some risk of dispersion and fragmentation of effort.

At the same time, this research has had to remain highly specialized, no doubt for lack of funds. Oriented almost exclusively towards technical/economic concerns, it has been confined to the conventional fields of investigation: investment policy and forecasting. There has been little work particularly on systems analysis (energy chains or interactions with the related sectors: ecology, socio-cultural factors, etc.), little attention to horizontal development aspects: multipurpose projects, or integration of energy into overall planning (linkages with agriculture, urbanization, industry, transportation or modes of development). Thus, preferential attention has been given to the traditional approaches.

The origins of the studies are in fact very diverse:

- instructions by the Bank's management: (1), (3), on nuclear energy;
- proposals by the countries: (4) Brazil, and (13) India;
- responses to events: topics generated by the oil crisis, (2), (10), (11), (9) and then (12) and suggestions by the United States Government, (6);
- policy orientations of the Bank, particularly the stress on rural development; (7), (8).

Thus, the degree of freedom of choice of research topics was limited. It is reflected chiefly in projects (5), (7), (8) and (12). In spite of everything, the research does appear to be well adapted to current developments.

Taken together, the topics cover fairly well the fields of major interest to the developing countries. Efforts have been concentrated mainly on conventional energy supply. New energy sources have been dealt with only in project (4), though they were touched upon also in (7) and (8). Very little work seems to have been done on energy demand: forecasting methodology in (5), and medium term estimations in (2) and particularly in (8).

IV. Conduct of the studies

The studies have been essentially pragmatic, which is consistent with the Department's avowed goals.

Liaison with regional staff and borrowers has remained small. While there have been informal contacts, the research is relatively isolated, perhaps because of lack of interest by the Department's natural partners in dialogue. This point is one of the greatest causes for concern.

V. Operational impact of the studies

The studies understandably vary in interest and value considering that it was difficult to gc beyond certain obvious priorities because of budget constraints.

The studies imposed by current events no doubt supplied answers to the questions of Management (1, 2, 3) and of the borrowers (4, 13). Anyway, these studies do not appear to be the most valuable ones from the "research" standpoint.

The series of basic studies on oil (9, 6 and 12) resulted in a very important breakthrough in Bank policy in the area of exploration and prospecting.

Similarly, project (7) has had direct repercussions on the organization of the Colombian energy system.

Project (8) can be expected to provide a useful framework for later studies and is a rich fund of information. In contrast, the most "theoretical" project (5), on demand forecasting models is rather disappointing.

The impact of the studies is no doubt dampened by the lack of contact with the operational sectors (regions and countries). If the regions (and the borrowers) do not instigate research projects and participate in them only from a distance, they are hardly likely to be greatly excited by them. The almost total lack of loan operations in the sector has certainly not helped to stimulate their interest in research. This situation could, therefore, change rapidly.

Overall, we note that the more positive studies (2,6, 7 and 8) have contributed to real progress in understanding development mechanisms and the definition of policies. We note also that they account for 70% of the research budget and are the most recent of the studies.

VI. Recommendations for the future

It is clear that the research capacity of the sector deserves to be strengthened. A total of four man-years of staff time plus four man-years of consultant time was proposed (by EWT). It is difficult to evaluate the validity of these estimates in absolute terms.

We note, however, that the proposals contained in the research program all appear to be valid: support for hydrocarbon loan operations; monitoring of the current energy situation of the Third World, compilation of energy data demand, management, study of conventional and non-conventional energy sources -- these are all topics that merit attention.

However, some of them reflect more an effort of internal training or of routine information follow-up than research in the true sense (e.g., world energy outlook, traditional and non-conventional energy, and risk analysis of petroleum projects). Others are not necessarily specific to the developing countries' (e.g., world energy outlook, energy demand management and conservation, and analysis of petroleum/gas agreements). Still others are very pertinent to the Bank's comparative advantage (e.g., LDC energy outlook, energy and development, and natural gas issues). But should world energy outlook and analysis of petroleum/gas agreements be dealt with by the Bank?

On the whole, a budgetary allocation of 2 staff-years and 2 consultant years appears to be appropriate (in comparison, the corresponding figures for the period 74-78, were 0.4 staff-years and 0.7 consultant-years).

There is anyway a very clear need to integrate the research projects into a medium-term program with the object of coordinating efforts, establishing priorities, mobilizing forces and monitoring the progress of the work without throttling creativity.

Action could be taken to strengthen thinking (and is that not a topic for study?) about the comparative advantage of the Department (and of the Bank) in the sector, with the object both of avoiding unnecessary duplication and of defining more clearly the specific nature of the research projects to be undertaken.

With greater resources available, it should be possible to widen the field of thinking to include systems analysis, horizontal aspects and overall planning of the sector, and to study more thoroughly the problem of demand: sectoral analysis, data collection, basic needs and need-formation mechanism, elasticities, and so on.

It is essential that appropriate action be taken to remedy the relative isolation of the sector by encouraging collaboration at all stages of research with the regions, the other departments and the borrowers.

In this context, we have also examined energy studies carried out elsewhere in the Bank; in particular the work of the Economic Analysis and Projections Department (EPD), which devoted a part of its efforts to energy.

The studies are, in general, interesting. They are clearly influenced by the fact that they have been carried out within a department whose main function is to produce numerical projections relating to commodities. Consequently, this work is essentially repetitive in nature and appears to be based more on the compilation and cross-checking of data (for consistency), rather than on actual research. Beyond such numerical forecasts, there is very little analytical work on the role of energy in the LDC's.

The methodology generally used in the EPD studies is rather conventional, i.e., simple econometric models for forecasting by extrapolation. Although such models have been previously applied mainly in the industrialized countries, their use in the LDC's by EPD may be justified as an essential first step to determine a preliminary frame of reference.

This analysis confirms the need for developing within the Bank, original work on important and relatively unexplored topics such as: traditional energy, alternative scenarios to study the impact of variations in oil prices, demand estimation by type of usage, comparative analysis of energy and the development process, and so on. An investment in research to establish specific methods of analysis in these areas will not only correspond to the Bank's comparative advantage, but also help to provide valuable answers to crucial questions.

Finally, the energy research as a whole appears to be needlessly dispersed within the Bank for purely historical reasons. The bulk of the studies on supply are carried out in EWT, but demand belongs to the DPS and coal to the Industry Department. It would make for increased coherence and efficiency if all energy studies were brought together in a single unit.

ELECTRIC POWER RESEARCH

A. PRICING

EWT has made an excellent choice in retaining marginal cost pricing among its areas for research. However, as the department's researchers correctly interpreted the scope of the task, it was an ambitious objective which required considerable resources. Although the value of results obtained from EWT's efforts was not in all cases commensurate with this ambitious objective, especially from the theoretical point of view; it should, however, be considered as a first step. EWT should have more resources available in the next few years, not to extend the concepts and methods but to ensure the training of local experts and to assist them in their work.

Marginal cost pricing (MCP), considered as an area of research and study associated with Bank loans, especially to electricity companies, corresponds particularly well to the concerns of the World Bank.

Indeed, conceived as it must be, which it is in this case, the development of MCP involves a global analysis of management, including operations as well as investment policy. By working in this way the Bank can evaluate the competence of the managers and assure itself of the viability of the facilities it proposes to finance. The comparison of the results obtained with financial or social (in the income redistribution sense) constraints, requires taking into account the distortions introduced in order to satisfy these constraints, and to weigh the consequences. The necessity to fully engage the managers of the companies in the studies leads to a beneficial training effort for the borrowers.

As for conducting the studies, the essential thing is to have the companies understand that the calculation of tariffs is not an activity of accountants but has fundamental policy implications. It should also be understood that in a developing country where the markets, either internal or external, often fail to generate prices which reflect real scarcities, it is more realistic to take into consideration approximate but meaningful shadow prices, rather than market prices, which are precise but distorted.

In this respect, EWT has tackled the problem well; certain approaches studied by EWT, such as the cost of power outages, should be used more frequently not only in the developing countries, but also in many developed countries, where the very notion is not always known.

However, the lack of means has undoubtedly not permitted EWT, in practice, to go as far as desirable in passing from principles to implementation. In the beginning, shadow prices used for developing the tariffs were not used in the choice of equipment - a practice which could lead to regrettable inconsistencies. Because of the lack of good data, the efforts made to determine the marginal cost of distribu tion still appear to be much weaker than those made at the generation level.

Anyone who has actually carried out a marginal cost calculation in a country where nothing was known about this technique, cannot blame EWT for these deficiencies; it is a long and exacting work.

The weakness of local data, the lack of previous training of counterpart local staff, the scarcity of international consultants really competent in this area, certainly did not allow perfect results to be achieved in such a short time, and in a number of countries simultaneously.

Having stated this, should we doubt the operational value of the results obtained?

Relative to the purely accounting practice traditionally used, the results are certainly positive, although not perfect, since a minimum of simulation will have been done to assure that the new tariffs will generate at least the desired revenue.

If, in applying the MCP methodology, the data which needs to be improved and the problems to be studied have been identified, if the effort undertaken to think comprehensively about the management of the company has created the need to see more clearly, if local experts have been trained who will be able to absorb the principles and subsequently improve their application, the calculation of marginal costs will have been worthwhile. However, these efforts must be followed up.

The subject of MCP continues to deserve an important place in the future work of EWT, and sufficient resources should be provided. It is not so much a question of more study of concepts and methods as one of improving their implementation.

The department has issued documents which already constitute a very good base for teaching and practical training. Undoubtedly, some points merit further study - notably (a) to widen the area of application of MCP to include the entire energy policy of the developing countries, and (b) in the area of social tariffs - but this is not the problem.

Very remarkable results have been accomplished during the past few years with very small resources. If one wants these efforts to be followed up, as deserved, it is necessary to enlarge considerably EWT resources in order to:

- make the responsible regional staff of the Bank more aware of the value of MCP;
- train local experts in the countries where the Bank is lending;
- assist borrowers in carrying out their own studies.

With the present state of competence of international consultants in this matter, the emphasis must be placed more on strengthening the EWT staff - and possibly the Regional staff of the Bank as well - rather than on increasing funds for outside consultants, in order to accomplish the ambitious task that the department has so rightly undertaken.

B. RURAL ELECTRIFICATION

As a factor in economic development and social progress, rural electrification can contribute significantly to the eradication of regional disparities. Unfortunately, however, the obstacles to be overcome are enormous -- high cost of plant, low demand from lower-income subscribers, **exorbitant** operating costs, difficulties in training personnel whose basic qualifications still leave much to be desired.

In the final analysis, these obstacles result in a financial burden that is difficult to pare down. Certain solutions are available, either in the area of pricing (cross subsidies, concessionary rates, etc.) or in that of technology (simplification of generating sets -- usually diesel, lightweight networks, type of utility poles chosen -- wood in preference to concrete, single-phase distribution, regrouping of generating sets so that they supply surrounding MV networks -- thus replacing small but more costly diesel sets, etc.)

But although the quest for simplified, suitably adapted technology may lead to lower plant costs, cross subsidies can be justified only on grounds of national solidarity (which are clearly not justifiable economically), since such subsidies oblige the population of towns whose electricity is supplied under economically viable conditions to bear the burden of rural groups supplied from decentralized diesel sets.

It is nevertheless important and encouraging to note that the Bank has decided to confront the problems of rural electrification and to assist in its general implementation and development. The studies carried out by the Energy, Water and Telecommunications Department are of great interest and should be pursued and broadened within a framework of closer contact with regional staff. It is equally encouraging to see that regional staff research efforts coincide with the action program formulated by the Study Committees of UPDEA (Union des Producteurs, Transporteurs et Distributeurs d'Energie Electrique en Afrique), one of whose main concerns is rural electrification. We have also noted with satisfaction that the Bank intends to rely on what it calls the UPDEA "forum" in providing support for a number of appropriate studies on this question as it relates to the African continent. One manifestation of the reality of this policy is the study the Bank has carried out on the rural electrification of Liberia, a choice made in conjunction with UPDEA, while another is the formulation of terms of reference for the interconnection of the Western and Central African networks, the financial costs of which were met by the Bank and CIDA. In concluding, we should like to put forward the following recommendations, which are discussed in greater detail in the sectoral report on rural electrification we have been commissioned to draw up:

(1) It would be desirable in the sphere of rural electrification for the Bank to refine a methodology for appropriate appraisal, since it is clear that the approach taken in this sphere must be different from that now used in the appraisal of classic projects in relatively developed regions of the Third World.

(2) Following the same line of reasoning, regional staff should as far as possible be nationals of the particular country or region to which they are assigned for the purpose of rural electrification studies.

(3) Efforts should go ahead to train borrower-country personnel in Bank methods of project appraisal and in any attendant rate setting operations.

(4) Qualified local personnel should be associated with project studies. While obviously meaning that more time must be devoted to such studies, this procedure would have the advantage of contributing to local training.

(5) Seminars dealing with very specialized questions should be focused more toward participants who are experienced and involved in the problems under discussion.

(6) Regional staff experts should be given broader opportunities in the field to initiate research projects that have been identified as necessary during the course of an appraisal mission.

(7) The general review carried out by regional staff during the project study procedure should as far as possible be interspersed with advice on both technical and management questions.

(8) The Bank should devote attention to training the personnel who will be engaged in the operation of a project it finances. Its role here would be to advise the agency responsible for training.

(9) The availability of a significant data base is essential if the duration of project studies is to be reduced. It would therefore be desirable for the Bank to stress to the enterprises involved the need for data which will facilitate its research and appraisal work, advising them if necessary on categories of data which need not be immediately required but which are eventually essential for project appraisal.

WATER AND SEWERAGE RESEARCH

1. Introduction

The UN Water Conference (1977), in which the World Bank played an active role, named the decade 1981-1990 as the "Drinking Water Decade" and resolved to provide safe water and improved sanitation to every person in the world by the end of 1990. From the mid decade report (1976) of WHO, it is concluded that by the end of 1990, about two billion people will have to be provided with safe water and sanitation facilities in the developing countries. It has been experienced that hardly any provision is made in the national budgets of most of the developing countries for research on water and sanitation, as these two subjects are primarily the responsibility of the local authorities. The latter have neither the funds, nor in most cases, the capability of suggesting any research programs. The private sectors which in many commercial enterprises are prepared to share the research and development activities of a country are very little interested in this field. Thus the World Bank's involvement, particularly in the research on low cost technologies would increase immensely in the coming years.

2. Choice of Research Topics, Conduct of the Research and Operational Relevance of the Results

2.1 Twenty research papers have been listed on water supply and waste disposal covering a variety of aspects. Subject-wise all these seem to be of functional interest with varying degree of importance. The panel had been requested to review the five major projects on water supply and waste out of which the document on the "Reuse of Waste Water" is of great significance but is still under preparation. A few smaller projects financed by the EWT Department have also been reviewed. The studies have however all been completed very recently and it would be unfair to comment at this stage as to how far the Bank's objectives have been achieved.

2.2 Views on the projects examined can be summarized as below:

(i) Village Water Supply (March 1976). This is a unique document of its kind considering the wide range of coverage and the analysis of various complex problems in rural water supply. However, a more formal transfer mechanism of the idea contained in it is necessary and should be further explored.

(ii) The project entitled "Observation of Rural Water Supply and Sanitation Programs in Eight Developing countries" is a "brief overview rather than an exhaustive study on water supply and sanitation activies," and is nonetheless a very informative document. However, the paper would have been more useful if the author had commented or expressed his views and made a critical analysis on the various aspects of the rural water supply and highlighted them in his conclusions.

(iii) The document on "Appropriate Technology for Water Supply and Sanitation in Developing Countries (1978)" is an outstanding contribution by the Research Division in the field of waste disposal and sanitation. The manual prepared has presented the alternative sanitary methods of excreta disposal suitable for different developing countries where socio-economic conditions, the behavioral pattern and the cleansing methods of communities differ widely. The greatest contribution this manual has made is by suggesting inexpensive scientific methods for spot disposal of human excreta eliminating the laying of sewers which cost almost 80% of a sewerage system.

(iv) What has been reported up to date on the research on "Design of Low Cost Water Distribution Systems" does not seem to be of much assistance to the field staff and the utility of the findings is very limited. Further work is needed to make the mathematical model universally applicable.

(v) The document on "Hand Pump for Rural Areas of Developing Countries (1978)" suggested use of PVC well casings and modification of other parts of the pumps. This is a follow up of the earlier paper of 1976. What is needed now is a comprehensive research and development protocol on the proposed pump design and including accelerated laboratory endurance tests and field trials.

(vi) The document on "Development of Well Screens for Local Fabrication in Developing Countries" requires further investigation. Extruded ribbed PVC pipes have been proposed to be used. A comparative study including the cost of the screens made from ribbed pipes as well as ordinary pipes used in other countries would be of greater interest.

(vii) The document on "Composting of Night Soil" is meant for the guidance of the Bank staff. Night soil compost with garbage could provide an economic return with its usage in agriculture. A field manual for use by all those interested in this field would be more useful.

3. Lessons for the Conduct of Research Projects

3.1 Dissemination of Research Results

(i) The research staff should visit the countries for the purpose of explaining the research findings to the country staff for adoption in the field, and also for studying the drawbacks in the research results where they are being practised.

(ii) Association of research staff in the Bank's project preappraisal or appraisal missions would enable the research staff to advise both the national as well as the regional staff of the Bank about the least cost solutions and other aspects of economy in the project.

(iii) The active involvement of the regional staff in the research program is necessary for the following reasons:

(a) They have direct knowledge of the problems in the field which require research and investigation.

(b) They could examine whether appropriate technology has been adopted for finding the least cost solution.

(c) They would provide feedback to the results of the Research Division.

(d) If the majority of the research projects initiate from the regional staff for solving their problems, both national and regional staff would take active interest in the research programs.

(iv) Holding of seminars, workshops and short courses and circulation of the publications are popular methods of dissemination. However, emphasis has to be laid on the selection of the right persons for attending the seminars.

3.2 It seems that budgetary limitations at times have made it obligatory for the research work to be completed within a definite period which has resulted in incomplete reporting.

3.3 Bank's Financial Support in Project Execution

This makes it easier for the Bank to propagate new ideas of low cost technological development by not supporting the traditional costly measures, which is also in the interest of the country itself.

3.4 Communications Gap and Collaboration with Other Agencies

(i) Communications between the Bank's research staff and the national and international organizations conducted research on similar topics need to be improved.

(ii) WHO and UNICEF are both significantly involved in this sector. WHO has provided sanitary engineers to large numbers of developing countries; thus the Bank could take the assistance of WHO and UNICEF in the collection of basic information and dissemination of research results.

(iii) The IBRD/WHO Cooperative Program which is now decentralized in the various regions of WHO could be of assistance in the dissemination of the research results and help in their assimilation by the national authorities.

(iv) Some research institutes and universities in the developing countries are involved in the research work in this sector. Some of the research work could be carried out by these institutions at a much lesser cost and would at the same time train the researchers in these countries. Perhaps the result of their studies might be more realistic and conveniently applicable in the developing countries, as they are well aware of the socio-economic needs of the countries. For similar reasons, involvement of individual nationals from the regions in the research program would be more helpful.

(v) Some international organizations, e.g., the Bank, WHO, UNICEF, and UNDP, could form a research coordination committee to avoid repetition of the research programs. The Bank could lead the work of such a committee as it could help the countries with financial assistance for applying the research findings in the field.

3.5 Choice of Research Topics and Settling of Priorities

(i) Priority among the research subjects could best be developed with the assistance of the regional staff based on their experience in the field.

(ii) Hardware (pipes) and other components of water supply and sewerage projects constitute nearly 50 to 80% of the total cost. Yet little research has been carried out to find out the less expensive materials which could meet the specifications of the developing countries. Thus research programs have to concentrate on these aspects in particular in future.

(iii) Answers to many simple problems which would affect the cost of production as well as capital cost, for example, the use of chemically treated water on slow sand filters, require investigation.

(iv) Investigation and research on the toilet pans and the connecting pipes suggested in the field manual have to be carried out to find the least cost which could be borne by the urban and rural poor. Similarly the effect on water quality of intermittent piped water supply prevailing in the developing countries by adopting "spot disposal" of excreta needs investigation.

(v) Governments have been adopting different measures to mobilize funds from different sources and have established different institutional patterns for the management of the utilities. Some case studies in different countries on these aspects to prepare guidelines providing different institutional patterns that could be adopted by different countries both for the urban and rural systems are needed. Similar guidelines should be prepared on the various alternatives which have been found to be successful in different countries on the methods of resource mobilization, the method of repayment, possible variations in the interest rates, payment schedules, relationship between cost and pricing, combination of rates and taxes, structuring of tariff schedules and tax levies.

TELECOMMUNICATIONS RESEARCH

Two World Bank research works in the telecommunication field are objects of analysis of this report, which is a summary of a more complete report presented to the Bank:

Access to Calls - A Perspective on the Economics of Telecommunications in Papua-New Guinea, by David A. Evans and Elizabeth B. Byron.

Telecommunications, Economics and Policy in the Developing World - by Robert J. Saunders, Jeremy J. Warford and Michael Tyler (Consultant).

The following comments apply to each one of the works analyzed:

1. Access to Calls

The research work Access to Calls, although addressing the specific problem of telecommunication in Papua-New Guinea, represents a very interesting and useful contribution to the understanding of telecommunication problems in general and in developing countries, in particular.

It is my belief that it is a useful contribution for overcoming the existing gap in the understanding of benefits and constraints associated with the supplying of telecommunication services to developing countries.

The lack of a convenient or even reliable data base represented an obstacle to the conduct of the research work, but the discussion of the different themes involved in the research is certainly a major contribution to general knowledge of telecommunication problems.

The methodologies and approaches adopted seem to be original and adequate for the stated purpose, but it must be pointed out that in applying such methodologies and approaches to policy orientation in other developing countries, care should be exercised in properly assessing real prevailing conditions especially under conditions of repressed demand that might invalidate efforts to provide services to low income classes before meeting the more important requirements of business and government.

The access framework derived in the study is an interesting concept but is mainly concerned with individual use of telephones and it is very important to stress that the most general and basic problem in developing nations is not that of individual use of telephones, but rather the more important need of providing such services, with adequate quality, for business and government purposes, which are at the very basis of the economic activity in the country.

The operational relevance of the research work is in the fact that it discusses some methodologies and proposes some strategies which are appropriate, in general terms, for the establishment of investment policies for telecommunication sectors in developing countries.

2. Telecommunications: Economics and Policy in the Developing World

The work "Telecommunications: Economic Policy in the Developing World" is very definitely an important contribution to the understanding of the influence of telecommunication in the development process, and the role telecommunication can play in developing countries.

The work reveals a very intimate knowledge of the prevailing situation of telecommunication services in developing countries, identifies problems and suggests strategies which seem to me very appropriate.

The fundamental discussion on benefits of telecommunication programs is quite extensive and illustrative.

It must be pointed out that, due to peculiar characteristics of telecommunication systems and the special situation in developing countries (excess demand, poor service quality), the models discussed to assess such benefits, as recognized by the authors, are unable to appropriately meet their objectives. As a matter of fact, telecommunication services benefits are quite difficult to quantify due to their characteristics of being essentially a means for transmission of information--the value of telecommunication services is then closely correlated to the role information can play in the development process.

Telecommunication benefits are then predominantly indirect rather than direct.

I think an analogy can be drawn between the telecommunication system of a country and the nervous system in the human body.

While, for instance, the circulatory system in human bodies brings direct benefits transporting necessary nutrients to cells, a benefit that can be quantitatively measured, the nervous system transports the necessary signals (information) that will cause the raising of an arm, the movement of a leg, allowing the individual to move, to perform an activity.

It is clear that in this case there is not a measurable direct benefit to the human body as in the previous case, but an indirect one concerned with the activity whose performance was ordered through the nervous system.

I think telecommunication plays quite a similar role in the development process: the efficiency of productive activities is significantly increased through use of telecommunication, and this then generates benefits to society in terms, for instance, of lower cost of products.

Such increases in efficiency make telecommunication services an important instrument to fight inflation, nowadays a worldwide problem, especially in developing countries.

Although they explore the possibility of applying marginal cost pricing to developing countries, they recognize the deviations from the ideal model are so great that such a method would basically serve to establish a minimum service price level.

The use of pricing policy to reduce excess demand, to increase system use efficiency and to generate resources for system expansion is quite realistically proposed by the authors. The work proposes strategies, especially in connection with pricing and investment, which can be considered of general interest and application for developing nations.

Experimental research works to develop new evidence and check theories and strategies proposed in the specific environment of developing countries could be an important additional contribution to the excellent work presented by the authors.

In my opinion this book should be published and disseminated among other specialists as well as among Posts and Telecommunications entities, especially those of developing countries.

Suggestions on Policies

The analysis of the research works just listed and my personal experience on developing countries telecommunication problems show that a very important set of directions and policies have to be adopted if telecommunication development is to be achieved in such countries.

A telecommunication expansion program in a developing country will be of very little use if not integrated to a set of measures designed to overcome the most important deficiencies on the institutional, managerial and operational levels, which are some of the basic difficulties of developing countries in the telecommunication field.

It is very important though that public sector agencies, when financing telecommunication programs in developing nations, give special attention to such subjects--a careful appraisal of prevailing conditions in such fields, at least, should be made.

Precise definitions on which authorities regulate, supervise and operate telecommunication services are very important to the success of telecommunication expansion programs.

The whole organization for providing telecommunication services in developing countries should be carefully studied as part of any telecommunication expansion program to be financed and appropriate measures adopted.

Unification of telephone companies into a single entity or their subordination to a single coordinating, supervising and planning authority is very important.

It is also very important that the power to establish tariff be concentrated in one single federal government entity.

Investment priorities should take into consideration the fact that the part of the society where economic activity is concentrated represents the bulk of unsatisfied demand in developing countries and should be considered as the first investment priority.

Provision of good telecommunication service to this part of the society will meet the needs of economic activities and will provide fast generation of revenues to be reinvested, allowing faster expansion of the whole system.

Appropriate priorities to different types of service should also be adopted in such a way as to concentrate investments into more profitable services.

In this respect, investment in the following order should be adopted: international services, long distance services among large cities, urban services of large cities, long distance for smaller cities and urban services of smaller cities.

It is clear that rural areas as well as less developed urban areas should not be left entirely deprived of such services and resources should be derived to meet their most essential needs.

An appropriate policy for public sector international financing agencies operations in developing countries, as I have mentioned before in this report, would be:

(i) finance long term (10 years for instance) system expansion plans; and

(ii) social investment content of the expansion plan (rural and other) would be small in the beginning, increasing progressively as basic telecommunication needs are met and the rate of return on capital increases.

Pricing, as also mentioned before, should be used as an instrument to reduce excess demand, increase system use efficiency and generate high revenues.

Adoption of market clearing prices as proposed by the authors is an appropriate policy that will lead to the abovementioned objectives.

The charging of inscription fees, exchangeable for bonus or shares, is another very important policy that should be adopted in developing countries to reach the same objectives.

Appropriate pricing policy, associated with an adequate level of inscription fees, will limit demand to those mostly in need for telecommunications services (normally business and government), will produce more efficient use of the existing system (especially when time metering and time/distance metering pricing system are respectively adopted for urban and long distance calls) and will increase system revenue, allowing its faster expansion. The adoption of such policy will also increase the demand for residential telephones.

As a consequence, the implementation of increased public call office (PCO) programs should be adopted to compensate for the decreased number of residential telephones.

Support to local industry should also be a very important objective of public sector financing agencies.

Priority should be given to the use of locally produced equipment in telecommunications programs as a means of consolidating industrial activity in the country, thus contributing to its socio-economic development.

Suggestions on New Research

The effective role telecommunication plays in the development process and the establishment of methodologies to measure its benefit to socio-economic development are fields of research to be further explored.

The two works anlayzed in this report are valid efforts in this direction.

More research effort should be addressed to derive experimental evidence that could enrich the conclusions of both works and confirm the validity of policies and strategies suggested or help in the establishment of other policies or strategies.

Research work could be addressed to the telecommunication-transportation trade off and to telecommunication as a production factor rather than a consumer's good. Telecommunication as a substitute for capital and labor and telecommunication as an input to other productive activities would fall in this latter category.

Research on institutional subjects concerned with telecommunication in developing countries would be a very important contribution to the improvement of such services in those countries.

A very important contribution telecommunication systems can bring to social objectives in developing countries is its use for transportation of radio and TV signals to be broadcast in different regions of the country.

I think this would be an important subject of research.

REPORT OF THE

TRANSPORT RESEARCH REVIEW PANEL

April 1979

Transport Research Review Panel Report

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TABLES:

I. INTRODUCTION

A. Terms of Reference

1.01 The Transport Research Review Panel (TRRP) is one of the groups established by the World Bank whose task is to assist the Bank Management and Executive Directors in evaluating the effectiveness of past research efforts and determining the size and nature of the program for the future. The case for undertaking research in the Bank the meaning and scope of the program have been widely discussed in the Bank; 1/ these issues were thus pursued by the Panel only in general terms.

1.02 The terms of reference of the group focussed on specific questions, answers to which could help the Bank in specifying its research task. In broad terms, they cover the following aspects:

(a) Evaluation of the past and present transport research effort;

(b) Efficiency in the execution of the research;

(c) Relation of research and Bank operations;

(d) Relevance of research to the needs of member countries and effectiveness of dissemination;

(e) Recommendations for future research in the transport field.

1.03 Transport research is among the longest established and most important research programs of the Bank. As research activities have widened, many research projects which originated from transportation activities have extended into other areas, such as rural and urban development, or human nutrition and health. Notwithstanding the relationship of those activities with the present research program in transportation and the overlapping that occurs, the Panel focussed primarily on those broader aspects that are specifically the task of the Transportation Department mainly in the case of rural development. Links and relations that seemed important are briefly referred to and gaps, where perceived, pointed out. The subject of urban transport was not dealt with, because it is the responsibility of another department.

B. Work of the Panel

1.04 The Panel was composed of six persons (see Appendix I) whose professional background permitted both specialized analysis and a broad assessment of the overall program and its characteristics.

1/ See memorandum of the President of the World Bank to the Executive Directors, "Bank Group Research Program", of January 23, 1976.

1.05 The TRRP met three times for one week in each session. The first session in July 1978 was primarily devoted to briefings by the researchers; meetings with executives and staff of the CPS, DPS and the Research Comittee; and an initial discussion with regional staff as to their suggestions for future research. The second session in October-November 1978 served mainly to obtain the views of Bank regional staff on the research program: its usefulness for Bank operational staff and for the borrower countries; the adequacy of dissemination of research results; and what they considered as priority areas for future research. During the October session a first rough draft of the report was produced and widely circulated for comment; it also served as a working basis for the members of the TRRP to be revised and complemented in the interim before the final meeting. The third and final meeting, the main aim of which was to produce the final version of the report, took place in February-March 1979.

C. Organization of the Report

1.06 The report is organized as follows:

Chapter II gives a brief evaluative overview of the transport research program, followed by a general evaluation of the past and present research and treats the issues included in the terms of reference of the TRRP. The specific assessment of each current line of research, i.e.:

(a) Highway Design and Maintenance Standards

(b) Substitution of Labor and Equipment in Civil Construction

(c) Ports

(d) Railways

(e) Socio-economic Impact of Rural Roads

is given in Appendix II. The different parts of this Appendix were drafted by the member of the Panel whose main professional interest coincided with the subject under analysis. The group as a whole then discussed and analyzed each section and in general terms agreed with its content. Appendix III includes a list of the recent World Bank Transport Research Reports.

Chapter III presents a description of possible lines for future research. Each section starts with ideas regarding future work on the research projects presently under way; next are suggestions for research into new topics. These were again developed by members of the group specializing in each particular line of research, and discussed and agreed by the group as a whole.

Chapter IV presents general recommendations and priorities that the group as a whole perceive as important for future Bank research in the field of transportation as well as the estimated manpower requirements of the program.

II. REVIEW OF PAST RESEARCH

A. General Overview

2.01 Table 1 provides a list of the nineteen transport research projects (ten 1/ undertaken with aid of Research Committee funds and nine, generally much smaller, carried out with Departmental resources) under review, including the manpower and expenditures for the period 1971-1978.

2.02 The two largest research studies -- Highway Design and Maintenance, and Labor Capital Substitution in Civil Construction -- are basically engineering-economic studies addressed to the choice of appropriate standards and technology in some of the most important areas of public investment decision making the Bank and developing countries face. The Highway Design and Maintenance Standards Study itself constitutes a major program of research initiated by the Bank, but being executed in collaboration with leading research institutions in several countries, both developed and developing. Its primary objectives are: (i) to provide a fundamentally new primary data base delineating the physical and economic interrelationships of highway design, deterioration, maintenance and user costs on a more rigorous scientific basis and covering a much wider portion of the complete spectrum of road conditions typical of developing countries than heretofore available and (ii) to incorporate these relationships in highway planning models to evaluate alternative project design and maintenance strategies. The Labor Substitution Study, which encompasses not only road construction and maintenance but also other civil works, particularly irrigation canals, is also a large study extending over several years which has been financed jointly with several countries and executed under Bank leadership. It arose from the concern to find efficient technologies which would utilize to the maximum extent the abundant surplus of labor available in many countries. Its objectives have been to establish the technical feasibility of alternative civil construction technologies utilizing different combinations of labor and equipment and in turn to relate these technically feasible solutions to relative factor scarcities so that the economically optimum technology can be determined in any given case. The cost of delays in project execution are included and practical problems in the organization and management of construction projects have been examined. The interrelationships between choice of technology and project design have also been investigated.

2.03 The principal concern of both these large studies is the development of a sound primary data base from which to derive reliable technical production functions for a range of representative conditions. The studies are characterized by meticulous research design, extremely high volumes of basic data generation, and development of new analytical/operational tools (models; handbooks). As would be expected, they have

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1/ As indicated on Table 1 by the Research Committee number given in parentheses after the project title.

Table 1: Transport Research Expenditures by Bank and Collaborating Institutions

	FY 1971 - 1978 ($ Current Prices)			Definite Future Commitment	
	Bank Staff (man-months)	Bank Funds ('000 $)	Other Funds ('000 $)	Bank Funds ('000 $)	Other Funds ('000 $)
Highway Design and Maintenance Standards	120	603.6	460	80	450
Model Development (670-27)	13	122.7			
Kenya Study (670-27)	17	242.2	410 a/		
India Study (670-27)	9	126.3	50 b/	80	450 b/
Road Analysis Model (RAM)	28				
Other	53 c/	112.4 c/			
Substitution of Labor & Equipment in Civil Construction (670-26)	135	759.7	1,147.1 d/		677.8 d/
Ports	27	31.0			
Port Pricing Policies (671-13)	3	31.0			
PORTSIM Model	24				
Railways	38	133.8			
Railways Costing Manual (RPO 223)	2	10.9			
Economic Role of Railways (671-50)	11	5.3			
Railway Subsidies in Europe	6	15.0			
Railways Action Plans Review	2	24.9			
Financial Analysis Model (FAST)	14	60.5			
Railway Model	3	17.2			
Rural Roads	73	178.1	80.7		
Appraisal Methodology	13				
Yemen (YAR) Study (670-29)	25	54.9	16.2 e/		
Ethiopia Study (670-71)	6	20.0			
Madagascar Study (671-14)	20	103.2	22.5 e/		
Research Design (Kenya/ Brazil)	9		42.0 f/		
Total	393	1,706.2	1,687.8	80	1,127.8

a/ Estimate of expenses to U.K. Transport and Road Research Laboratory, 1971-75; additional contributions in kind were made by the Kenya Ministry of Works.

b/ Estimate of expenses to the Central Road Research Institute, New Dehli.

c/ Approximately 27 man-months of Bank staff time and approximately $20,000 of Bank funds have been spent in support of the massive Brazil UNDP highway research project, $2.4 million of which is funded by UNDP and upwards of $12 million by the Government of Brazil.

d/ US$1,825,000 equivalent has been contributed to this study by the Governments of Canada, Denmark, Finland, Germany, Japan, Norway, Sweden, United Kingdom, and the United States.

e/ Travel, field allowances and scholarship stipends provided by the Swiss Federal Servicesof Technical Cooperation and the Federal Institute of Technology (Zurich).

f/ Funds provided by the Swedish International Development Agency to assist in development of methodology for Kenya rural roads study program.

taken a number of years to carry out and have required substantial funds from many sources -- which are unlikely to have been generated without the Bank's involvement and leadership. Both studies address key problems for developing countries and both have produced results which have already been incorporated in Bank projects in several countries and their use is now beginning to grow rapidly. Their ultimate usefulness will depend on their adaptability to the widely varying range of conditions (physical, economic, social) in the Bank's member countries, and the effectiveness of the effort made by the Bank to disseminate and propagate their use.

2.04 A second group of much smaller studies deals with ports and railways -- areas of large Bank investments -- and concentrates on problems of adequate pricing and efficient operation of existing facilities. In railways earlier efforts were limited to two small but excellent efforts -- the first a railway costing methodology and the second a review of operational Action Plans to improve railway operating efficiencies -- and more recently development of the Financial Analysis System (FAST) which has provided an easily usable computer model for financial analyses that has proved popular with users in other sectors as well as railways. The recently initiated studies on the Economic Role of the Railways and Railway Modelling are intended (inter alia) to develop better methods of forecasting railroad traffic demands, analyzing the role of railways in national transport and planning investments. Undoubtedly of high value in an era when railways around the world are increasingly in financial straits, these projects may well prove to be a major research undertaking as the Bank searches for a better basis to guide its railway lending.

2.05 The question of adequate pricing has important implications not only for economic, but also for social reasons. This has been evident in the pioneering work developed by the Bank in earlier years for road pricing; the current work on the application of marginal cost pricing to port operations is a logical continuation of these efforts in a new field. The theoretical work done so far is outstanding; its applicability in practice will vary from country to country, but will probably be enhanced when the findings of the research are tested in case studies (now underway) and subsequently summarized and translated into manual form for greater simplicity of application.

2.06 A third group, dealing with rural roads, has a broader and, in some respects, more ambitious approach. While concerned with the problems of economic evaluation, it concentrates on the development of new approaches and benefit measures rather than on the calibration and fine-tuning of existing ones. Rather than taking postulated project effects on output and income for granted and focussing on the quantification of road user savings as in the traditional methodology, this new approach concentrates directly on establishing changes in farm/household income or "producer surplus" and incorporates benefits from increased on-farm subsistence consumption (often of key importance to the rural poor). Further efforts are also made to respond to the multidimensional problems of rural development through a broadened approach to project evaluation requiring

interdisciplinary or multi-sector inputs (transport, marketing, agriculture, community organization, 'regional' analysis). To develop and test the new approach, a small program of before and after case studies was launched in three countries beginning in 1973. These studies examine three basic sets of issues: (i) the distribution of benefits among truckers, traders, producers, consumers, and how this distribution is affected by institutional factors such as the structure of the trucking industry or land tenure patterns; (ii) producers' response to higher farmgate prices, lower input costs, and improved quality of service; and (iii) non-transport constraints which might prevent producers from responding to the incentives provided by the road project, e.g., the availability of required resources, attitudes, risk preferences, etc. Given the importance of agricultural populations in developing countries, and the key role of food production in the world, the relevance of the subject is unquestioned. The quality of the work undertaken has been high. Despite the absence of useful precedents in this type of research there has been emphasis on rigorous techniques in the three case studies undertaken to date. Additional work will need to focus on establishing what are the key parameters needed as inputs to a socio-economic analysis, for which simplified tools (manuals, computerized programs, etc.) can be developed and refined.

B. General Evaluation

2.07 Looked at as a whole, the transport research program under review has few signs of actually being a "program". Rather, research has been initiated in areas where the need for a better data base or for new analytical tools became apparent in Bank transport project preparation and evaluation. This ad hoc approach is quite correct, as long as care is taken that the Bank continues to concentrate -- as it has done to date -- on those areas of research where its comparative advantage is strongest. Given its substantial role in gathering and processing information on most of the world's economies in the course of its normal activities, the Bank is particularly well equipped to (a) determine what essential pieces of basic information needed for project work are not available; and (b) secure the cooperation of a wide range of member country agencies and international institutions in establishing them. Development of generally applicable methods and operational tools from the case studies undertaken is important and should be pursued vigorously.

2.08 Increasingly, the research has addressed broader issues as concern about distributional effects and other social impacts has increased and as the need for intersectoral or regional approaches to some development programs has become more obvious. It should continue to do so. However, care must be taken that the models developed are relevant to the needs of Bank project work, and are manageable and useful tools to aid the evolvement of new policy directions both for the Bank and its member countries.

2.09 The primary focus on the problems of project preparation and evaluation has in fact served well to give purpose and direction to the Bank's transport research. The hallmark of this research has been the

bridging of the gap between theoretical models and what reality can supply in the form of empirically established relationships. In the case of highways, civil construction technology and socio-economic impacts of rural roads this has been an enormous task, which has involved literally hundreds of thousands of field observations on engineering and economic relationships over several years in remote corners of the world and intensive analytical effort to translate findings into operational tools. The results have been commensurate to the effort: this work is likely to supplant much of the existing literature of planning coefficients on the economic benefits of highways; a solid body of information on which to base choice of factor mix in civil construction has been established for the first time which has already contributed to the introduction of more appropriate technologies in several countries; and the basis has been laid for a rigorous evaluation of the socio-economic impacts of rural roads which is sorely needed to better guide major investment decisions in the increasingly important rural development sector. The overall accomplishment has indeed been impressive, clearly placing the Bank and its collaborators in a preeminent position among the world's leading research centers on the problems of transportation in developing countries. While these large, long-term efforts have tended to preempt much of the limited available Bank resources, it must be recognized, first, that these fundamentally important works would not have been done without Bank leadership and second, that the Bank's own contribution has been a fraction of the total costs which have largely been paid for by other donor agencies and governments who see themselves as direct beneficiaries of the research.

2.10 Finally, it seems important at this stage to point to the recommended characteristics of future developments with respect to the projects described. Emphasis should clearly shift from the research activity proper to wider application and dissemination of results. This is particularly true for the first group of 'engineering studies', while for the second and third groups (ports, railways and rural roads) a broadening of the data base might have to go hand in hand with the development of operational tools for economic and social analysis and evaluation of the projects, and their pricing, organization, operation and management aspects.

C. The Execution of the Transport Research

2.11 The execution of the transport research projects has been undertaken by staff members directly or, particularly for the larger projects, in collaboration with other institutions or by consultants under the supervision of staff members. It is recommended that this approach be continued, that is, studies which focus on data collection, specific engineering aspects or analytical methods in general, be contracted out. Bank staff would then concentrate on economic and social aspects of research where their comparative advantage is. This approach should increase the flexibility of the research program, while keeping a lean institutional basis -- which must, however, be strong enough to provide the close supervision such a formula requires.

2.12 The above approach has implications concerning the question of appropriate Bank resources to be allocated for research in transportation. In the past, for the larger projects the Bank has relied on other donor agencies and developing country governments themselves to finance the great majority of costs and the Bank has limited its staff commitment primarily to supervision and monitoring of external researchers. While the net result has been that the limited resource commitment by the Bank has had a much magnified impact, this strategy has also had some limitations. Research on highway design and maintenance standards, in particular, was delayed by at least three years as the study fully prepared in Western Africa in 1972 had to be abandoned for want of co-financing, and the subsequent study in India was similarly delayed. Since the total costs of the research are an insignificant fraction of the annual investments in highways, perhaps it would have been preferable for the Bank to have put in a larger, more concentrated effort to have gained earlier benefit of the research. Certainly now that much of this research is reaching completion, the Bank should make a concerted effort to evaluate it and translate it into operationally useful tools. By its nature much of the work must be done internally within the Bank rather than by outsiders. Although it is outside the panel's purview to specify overall amounts of resources to be allocated to the research program in the future, the direction of the recommendations is towards increased staff requirements.

D. Relations of Research and Bank Operations

2.13 Of particular importance is the issue of how the Bank's research is connected with its other activities. In the specific case of transport research, given the long history of research in the field, the past involvement in this research of executives now working in other parts of the Bank, and the immediate relevance of the work done to numbers of problems under analysis in the Bank, it appears that the links to Bank operations are strong. In fact, as mentioned earlier, most of the research emerged from perceived needs of Bank operational staff and feeds into the process of project analysis inside the Bank and with the countries concerned. For instance, the approaches developed in the Highway Design and in the Labor Capital Substitution studies have already had major impact on several projects approved for Bank financing within the last two years.

2.14 Regarding the dichotomy of research in response to perceived operational needs (which tends to be narrowly focussed) and the inherent dynamics of the research process proper (which tends to widen the research horizon) the following comment is offered. Given the wide variety of particular needs and the constraints -- human and financial -- to answer all of them, it seems particularly important to try to conceive a medium term program which will provide a workable framework both for the department and the rest of the Bank. Such a program ought to be conceived along the recommendations of Chapters III and IV. At the same time, the subjects taken up ought to be of generalized application or constitute case studies which can be adapted to different conditions with relatively little effort.

2.15 A last important point concerns the communication process inside the Bank. Nothing can replace direct discussion between the parties concerned in the research and application ends on the issues of priorities, relevance, and usefulness. It seems that the Transportation Department has been applying that approach. It is commendable and should be reinforced.

E. Relations with Member Countries

2.16 The question of the impact of the Research on member countries could be addressed only partially through discussions with Bank staff and from the experience of some of the members of the TRRP. It is difficult to draw general conclusions from these. Nevertheless, some specific points seem to emerge.

2.17 The first is that in the cases where effort was spent on trying to reach a convergence of the perceived needs on the part of the country and the Bank, the results tended to be highly positive; outstanding examples of this are the Highway Design Studies in Brazil and India which address important investment decision problems in those countries and where the great majority of costs and effort is borne by those governments rather than the Bank itself. Of course, the convergence was dependent on the involvement and commitment of the government agencies, and on the will of the Bank officials to invest time in appropriate communication.

2.18 The second is a consistent stress of the need to improve the dissemination of the research undertaken. This process covers a whole range of aspects, starting from the production and distribution of appropriate reports and manuals, through the organization of seminars and finally to long run considerations such as the type of academic connection needed to channel new ideas to future generations.

2.19 The question of whether the Bank should attempt, through its own research activity, to strengthen the research institutions in developing countries is an important one. On balance, such institution-building should not be the main aim of the Bank research program per se. It is a worthwhile and extremely important task, but it should probably be tackled separately; in any case, it should not interfere with the research needs of the Bank. What is required is the closest possible contact between the research units of the Bank and relevant institutions throughout its member countries. They ought to be considered especially qualified partners because of their knowledge of local conditions and they ought to be offered opportunities to compete for research contracts of the Bank. This will be a most useful contribution to the strengthening of research and evaluation capacities in developing countries.

III. FUTURE LINES OF RESEARCH

3.01 The chapter draws up future useful lines of research as the panel sees them today. Our ideas on this subject were influenced by three sets of factors: first, the major transport problem areas faced by developing

countries which were felt to be researchable; second, the need to better exploit the results of major research now being completed by the Bank and the much larger work of the research community as a whole outside the Bank; and third, the comparative advantage of the Bank in conducting or organizing research.

3.02 The Bank has great comparative advantage for projects summing up available knowledge and its borrowers' relevant project experience in 'state-of-the-art' surveys and review papers on particular issues, with appropriate comparative statistics. The panel feels strongly that such projects should be carried out systematically and much more widely than today. These ideas and others are discussed below. In a few instances the ideas are grouped under the heading of miscellaneous technical guidelines.

A. Highways

3.03 The work on the Highway Design and Maintenance Standards Model (HDM) will be finished during the planning period. The model will greatly help in the choice of relevant standards in road construction and maintenance. Already the weight of problems in road planning is shifting to maintenance and traffic management. In future the panel clearly foresees another shift in planning attention to organizational and administrative problems. The research program reflects this shift in priorities.

3.04 Further Work on HDM: The work on HDM should be completed by the addition of data and experiences from Brazil and India. These findings as well as other sources of information may imply some substantial revisions and extensions of the present HDM. But a useful model already exists based on the Kenya study and other available knowledge; both the formal model structure and a user's manual should be published and widely circulated. Deliberate efforts should be taken to have the model effectively applied. Seminars and systematic training should be carried out. A simplified version, possibly in the form of tables, should be produced for people evaluating, e.g., only separate road sections. The earlier publication on quantification of road user savings should be updated, and finally a book on highway design and maintenance economics may be published forming, so to speak, a natural and temporary end to the great effort of evaluating design standards in road construction. Bank staff should stimulate other agencies to carry on further research as necessary to adapt HDM to local conditions, but the Bank should finance such undertakings only as a last resort.

3.05 Maintenance: It is necessary for any country to keep sufficient levels of maintenance on its highways. However, there is an expressed lack of knowledge of the impacts of various maintenance levels and of maintenance components on traffic, traffic conditions and on user costs; the data collected under the Highway Design research to-date makes an important contribution to filling this gap. In many countries maintenance suffers from inefficient organization and administration. The Panel welcomes the excellent review paper on the maintenance problem just completed by the Transportation Department, drawing extensively on past project experience as well as the Highway

Design research. Further experience in pursuit of the policy emphasis sketched in the paper will probably show particular aspects of the problem which need to be studied in greater depth and will need to be incorporated into the list of priorities at the first time of revision.

3.06 Highway Safety: Highway traffic safety imposes grave problems on all countries that have reached a certain level of motorization. However, it is not at all clear how traffic safety will affect Bank appraisal work and lending procedures. The panel suggests a project to sum up the knowledge on accidents, their possible explanations and measures to reduce them. The project may end up with a program for future work on traffic safety problems. At least it will develop a better basis of knowledge about past research and experience in road safety programs to the benefit of borrowing countries.

3.07 Road User Charges: The issue of relevant road user charges, tax and subsidy structures is an old and important one, on which the Bank has often called for studies by its member countries. Depending on the prevailing policy in a country one may get distortions that may cause severe problems. The panel urges the Bank to embark upon a project that will review past experience in depth, sum up the prevailing policies in selected countries, and evaluate their likely effects.

3.08 Bus and Trucking Industries: Regulation and Organization: The project will lead to a framework for appraising projects in the fields of bus and truck services and for advising countries on the institutional set-up and regulation of such services (licenses, charges, taxes, etc). We note that the Bank more than ten years ago commissioned research on the subject of trucking industry regulation and that it is also now increasingly receiving requests for financial assistance to the road transport industry. The earlier research needs to be brought down to a more operational level and a methodology evolved for assessing the sacrifice involved in -- or economic cost of -- regulatory controls as against free market operation. More attention needs to be given to alternative ways of managing and organizing transport companies and their pros and cons, and a better basis developed for the Bank's potentially important participation in assisting countries on development of transport services. The project may also comprise employment and development aspects of the transport industry.

3.09 Miscellaneous Technical Guidelines: It is vital for the good use of HDM as well as for road planning generally that important factors like present and future traffic and its composition, and road network conditions be known. The Bank should review available literature and propose and disseminate technical notes or guidelines on the best organization framework and technical procedures to be used in traffic census and forecasting, road inventory methods, etc.

3.10 Traffic Engineering and Management: Congestion on urban and other roads does not necessarily imply investment in new infrastructure. Better traffic management may be the answer, such as the Bank has especially been

promoting in urban areas. The Bank should sum up existing knowledge, for the better use of the existing road network. However, considerable caution must be exercised when applying traffic speed/flow or capacity relationships developed in Europe or North America to the very different traffic characteristics of most developing countries. It is to be hoped that the research in Brazil and especially India on traffic flow simulation will lead to improved procedures for dealing with the problems of congestion.

B. Substitution of Labor and Equipment in Civil Construction

3.11 In order to enhance the effectiveness of the investment already made we believe that the study should continue, primarily focussing on the socio-economic impact of labor-intensive programs, at the national and on the local level, on such matters as balance of payments, community integration, income distribution in the areas directly affected, and on the effect of unemployment on development. Also attention could usefully be given to labor-intensive construction beyond roads and irrigation works. Furthermore, it needs to be taken into account that, given developing countries' typical shortages of foreign exchange for purchasing and repairing equipment and given the scarcity of equipment operators, use of labor-intensive techniques can often substantially increase the total volume of works that can actually be accomplished in a given period. In this way, past research efforts will yield more benefits both for the Bank and member countries, given the low marginal cost of such work. In addition, the Bank has a comparative advantage in exploiting existing experiences from certain countries which at present are implementing labor-intensive policies; brief comprehensive evaluations of these initial efforts should be prepared and disseminated.

3.12 The scope of the study should be broadened by taking low to middle income countries into account. A study which concentrates only on the very poor countries will not arrive at proper solutions for somewhat more advanced countries, mainly because of lack of information and because of the special conditions in many of these countries. Furthermore, it happens that precisely in low to medium income countries, local consulting firms and institutions have achieved certain technical experiences. They could work not only as efficient suppliers of information but could also be involved in the research process proper.

3.13 But the main need under this topic is to assist the development of more pilot and demonstration projects in labor-intensive construction in a wider variety of countries that are not at present using such techniques, to participate actively in the implementation of such projects, and to ensure systematic promotion of the handbook, when completed, among member country agencies and consulting firms.

3.14 Domestic Construction Industries: The efficiency of labor-intensive works, now usually carried out directly by government agencies on a force account basis, might be substantially augmented if the works were carried out by private enterprise. However, in the majority of developing countries there is no real domestic construction industry, nor are there reliable

studies related to its promotion. Therefore, it would be advisable that the Bank help its member countries by conducting research on the feasibility of developing or improving local construction industries.

3.15 Thus, for more effective pursuit of the policy established by the Bank in 1974 for explicitly supporting the development of domestic construction industries in borrowing member countries, and as a further broadening of the work on labor-capital substitution in civil construction, reviews are needed, for a sample of about five countries, of the factors inhibiting the growth of the domestic construction industry (of all the various levels of capital-labor intensity appropriate for different types of works) and of the ways in which growth can be effectively stimulated. This would be combined with an assessment of the effectiveness of the various initiatives taken by the Bank in particular countries over the last five years, in order to produce, as early as possible, a position paper on the 'state-of-the-art' in strengthening these industries -- in order to provide government officials and Bank and other agency staff better guidance on planning, implementing and evaluating programs to strengthen domestic construction capacities. Such a study would need to be coordinated with other departments, in Regions and in Central Projects Staff, such as Industrial Development and Finance, and Education.

C. Ports and Shipping

3.16 Port management needs in developing countries tend to be concerned with the specific rather than the general (e.g., should a certain type of machine be purchased or not?). Broader policy questions are usually addressed mostly at the ministerial level. Hence, to meet ports' specific needs (and these are frequently encountered by Bank field staff) research could be done to see if it could be feasible to develop models to provide some answers to these specific questions.

3.17 Simulation of Port Operations: In many loans, debate arises as to the best type of equipment mix to be procured for serving the berths. This is because of the wide variety of handling equipment available in the market. The situation is analogous to that of selecting a suitable fleet of aircraft types to service the various routes taking into account distance travelled, load factor, etc. It would be useful if detailed simulation models could be developed in such a way as to simulate the sub-systems of the port. This would take into account such aspects as berth configuration, depth of back-up space, quality of maintenance of equipment, etc., so that various alternatives could be presented to decision makers as to the mix of equipment to be purchased for servicing present and future traffic.

3.18 Simulation models for exactly these purposes are already in existence for conditions in developed country ports. With the Bank's experience in developing PORTSIM for wide application, it would be possible to go on now to study the feasibility of modelling port sub-systems for general application in developing country ports. Ideally, the models to be developed would require few, commonly available parameters to facilitate the use of the models in the widest possible range of situations without loss of validity.

3.19 Port Pricing and Investment Policies in Developing Countries: A general theoretical framework for the application of marginal cost pricing for congestion has now been developed, but there is still a long way to go before the theory can be usefully applied. Work is planned on port accounting systems to see whether they can already produce the information required to apply marginal pricing principles, and whether any administrative changes that might be necessary to produce such information regularly would be reasonable in cost. The opportunity would also be taken to review the difficulties that have often arisen in the past in implementation of the recommendations emerging from the port accounting studies that the Bank has promoted.

3.20 If the pricing approach proposed proves practically feasible and acceptable, then its implications for the programming of investment would merit additional attention. Since traffic can be forecasted and since port facilities are "lumpy" investments, the timing of construction, realization of the "correct" number of berths and acquisitions of other equipment to capture the trade is important. Hence future ports research work should aim at developing an easily applied methodology to time increases in port capacity in such a way as to meet the anticipated traffic while maximizing the net present values of revenues to the port.

3.21 Impact of Port Projects on Regional Development: There are two rather different dimensions to this question: (i) port industrial areas, as developed in countries such as France, Ireland and Singapore, with the issue being proper economic and institutional analysis of the interactions between port operations and the industrial activities, and (ii) the impact of containerization and its penetration into the broader port hinterland, with the issue being the distribution of benefits and costs from use of containers and the stimulus they can give to trade. These are major research areas and appropriate methodology which has been used in some developed countries could be examined to see whether it might be applied to developing countries. The results of the research would help Bank staff to better advise developing countries considering port construction and expansion, or the introduction of port manufacturing areas, and contribute to a broader-based and more satisfactory appraisal of projects proposed for Bank financing.

3.22 Structure of Port Management Systems: Many ports in developing countries have ineffective management reporting systems; feedback is poor and long time lags occur between directives and implementation. Many of the problems faced by these ports are management rather than technical problems. The Bank in its review and appraisal of port investment projects already possesses enormous amounts of information and analysis on ports management structures, information and decision systems in various parts of the world. A compilation of this information would be useful. Included in the compilation would be reviews and comparative analysis of Bank experience before and after loans are made and projects implemented. A by-product of this compilation and review could be the identification of the general training needs of port management personnel in developing countries.

3.23 Ocean Shipping Potential for Developing Countries: Development of a conceptual framework for a developing country's decision as to whether or not to go into ocean shipping or extend its present participation in this field, with collection of relevant data on countries' actual experience to date is desirable. Since this is an area of concern to more and more developing countries, and the Bank has apparently already received various requests for advice, we are pleased to see that the Transportation Department has already started a small amount of work internally on the subject, but we believe that the complexity of the issues involved and the difficulties of obtaining relevant empirical information are likely to require a more ambitious follow-up to the in-house effort in the form of a larger study.

3.24 Coastal Shipping Potential: A review of comparative experience (e.g., in Japan, Indonesia, Philippines, India, Madagascar, Brazil) is proposed in this area of considerable potential for many countries but little Bank involvement to-date. This should investigate advantages of, and obstacles to, coastal shipping and explore the scope for relieving the latter. The question of appropriate technology should also be addressed.

3.25 Inland Waterways: Again, a review of comparative experience (e.g., for Egypt, Panama, Bangladesh, Burma, Belgium/France/Germany, Argentina/Paraguay) is suggested. We understand that a number of projects are coming up in this area for possible Bank financing, but that the Bank does not have any in-house expertise in this field, so that a special effort is needed to review past experience and problems to enable the Bank to better direct the consultants who would be used for operational work.

D. Railways

3.26 The Railways constitute a complex integrated system involving many technologies and management skills. Naturally the interesting suggestions put forward by the Bank staff as to possible research in the Railway field have been very many and of varied scope and importance.

3.27 There is little doubt that the work recently begun on (a) the Economic Role of the Railways and (b) the Railway Model ought to be given the highest priority for continuance and completion. The Economic Role study should enable better insights into the modal choice questions and determinants of rail traffic and assist significantly in future Bank Railway sector operations. The rail model should be particularly useful in project evaluation work and coordination of the system effects.

3.28 Many of the suggestions from the regions for future research concerned specific technical problems. These need to be dealt with in one of the two ways set out in the immediately following paragraphs.

3.29 The CPS is in touch with a good deal of very useful Railway research that is being done outside the Bank. It is doing good work in bringing this to the notice of the regions and this work needs to be continued and increased, with the CPS perhaps issuing occasionally subject-by-subject lists of those studies which are considered of specific usefulness

to Bank staff (in other words lists of "recommended reading") on Railway issues which come up frequently in the appraisal of Railway projects. Further, the Transportation Department's initiative is to be strongly commended and its effort pursued of developing a "Transportation Resource Person" system in the Railway field for the Bank as a whole (as described in para. 4.04).

3.30 In addition to the above, there is a specific need for the Railway experts of CPS to organize the publication of more 'state-of-the-art' or survey papers. The Panel's detailed recommendations as to future research work including work of this character in the field of Railways are mentioned here briefly.

3.31 Comparative Costs of Rail and Other Modes: The Panel agrees with the Transportation Department's suggestion for a research study on the above subject combining theoretical and empirical work, to produce better benchmark and analytical frames for this type of analysis. Such work would complement and supplement the ongoing work on the Economic Role of the Railways, but, it should be mentioned, may perhaps reveal the need for a more elaborate Phase 2 research later.

3.32 Railway Training Issues: Bank staff have high-lighted as basic in many countries the problems regarding maintenance and operation skills. A study needs to be made of the training systems presently in use in representative countries and recommendations formulated for the guidance of borrowing countries as to how training may be brought up to satisfactory levels.

3.33 Electrification and Dieselization: The issue as to when electrification of even intensely used rail track/routes is justified rather than continuance with diesel is one of importance. The general issue has been examined in various studies, notably by British Railways and French National Railways. But these have not always been accepted as wholly objective and critical. The Bank should bring together and evaluate what has been studied and examine what more needs to be done. The study should deal inter alia with the energy sources (electric power/diesel oil) used by the two systems and how any changes that can be forecast in their relative prices in real terms over a medium period are likely to affect the question.

3.34 Restructuring Railway Systems - Closure of Sections/Services: It is well known that there is financial case in many railway systems for the closure of certain branch lines/stations and abandonment of certain services, perhaps even for a major curtailment of the Railway system. The issue comes up repeatedly in Railway project appraisals in various countries. But few borrowing countries have in fact been able to accept the advice for specific closures; the experience in developed countries with section/services which make heavy losses is not very different. However, there have been certain limited successes. Steps which could facilitate closure in appropriate cases have been considered in this context and these include (i) organization of an improvement of services in alternative modes (as regards reliability, regularity, reasonable cost, etc.);

(ii) redundancy payments for labor displaced by closures and schemes for retraining and absorbing them elsewhere; (iii) transfer of financial responsibility for the decision on closure or continuance to the particular regional administration concerned, etc. An in-depth case study is needed of the situation in representative countries (including especially those recording some successes), covering the detailed case for closure or continuance and ways of facilitating and achieving closure in appropriate cases.

3.35 Maintenance and Utilization of Equipment: The Bank's experience with Railway borrowers has shown the over-riding importance of the satisfactory maintenance and utilization of equipment. The completed Action Plan Review reinforces this lesson very clearly. The question arises in an important way in the context of locomotive maintenance and utilization but it is very relevant as regards freight cars, passenger coaches and other equipment. A study which could provide the foundation for guidance to Bank staff and to the Railway borrowers is very necessary.

3.36 Other subjects recommended for study are:

(1) Information systems in Railways: Data collecting that, at the minimum, should be organized for satisfactory maintenance, operation and investment planning;

(2) Track wear related to maintenance and operating conditions;

(3) Signalling and telecommunication systems: Least cost solutions for the upgrading that would achieve the particular magnitudes of increase needed in line capacity consistent with safety.

There may be a need felt in the coming years for one or two other technical studies.

E. Research into Rural Roads and their Socio-Economic Impacts

3.37 The research on rural transport should not only be continued but expanded in different ways. It addresses itself to the Bank's present lending priorities in the rural sector, 1/ focussing on the poorer groups; this emphasizes the need for an approach integrating the social and economic factors, in an effort to solve some of the problems of rural development. Rural roads -- and the means used for moving people, commodities and information generally -- are a necessary and important component of many rural development projects; they may account for more than 50% of the cost. In this field many disappointing results stem from the inadequacy of traditional economic tools when confronted with complex socio-economic and institution problems, e.g., distribution effects, regional planning, social dynamics. New tools should be designed to deal in a systematic way with these

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1/ Over US$3.0 billion last year.

issues. A significant amount of resources (mainly Bank staff time) should be invested in order to explore these new avenues that may earn a good return for the Bank as well as for the countries concerned. It would be useful to continue along the innovative lines and methods of socio-ecnomic analysis developed in the Bank since the beginning of the seventies.

3.38 The Bank's operational need for deeper and better empirical information about the social as well as economic impact of rural roads and other rural infrastructure seems to be urgent. First, there are the ex-post evaluations of many past rural road projects and components which indicate disappointing impact compared to that expected; the response to that finding has been, quite rightly, to link rural road construction much more directly with simultaneous actions in other fields such as agricultural extension and marketing, but it is not yet clear whether this is a fully adequate solution. Second, while the Bank has taken very strong initiatives to promote projects which would help to solve the socio-economic problem of poverty, severe difficulties quite often arise in discussions with governments in reconciling their criteria for selection of roads for construction with the Bank's largely economically based selection criteria; the Bank should be in a better position to advise on what social effects roads (and other infrastructure) can really have. Third, we were very struck by the emphasis that several of the Regional Projects Directors placed on the difficulty of correctly forecasting even the types of impact presently stressed by the Bank -- such as on production and on transport costs -- because of lack of empirical knowledge about factors like farmer response, consumption elasticities and efficiency of transport service enterprises, which are heavily affected by behavioral and social considerations. The urgent need is thus for pooling of practical knowledge and experience from a wide range of circumstances, and for methodology only to the extent necessary to sort and classify this empirical information in an operationally applicable manner.

3.39 As transport needs of rural populations can only be analyzed in terms of a combination of socio-economic factors, a fair amount of research and experience in this respect has been accumulated by the Transportation Department; this is reflected in a number of reports and papers (see Appendix III). It follows the trend experienced on a world-wide basis in the field of transport economic research -- the recognition of the true nature of transport as a service intimately dependent upon the needs of the many different economic and social activities in a given area, which has led researchers to link transport with regional planning and spatial organization. This integrative approach has made transport research a multidisciplinary field, gathering specialists of various backgrounds -- engineering, economy, sociology, political science, geography, management. This is in line with the shift of emphasis, experienced in the Bank as well as outside, from the problems of infrastructure towards those of management and organization of transport activities.

3.40 These considerations explain why we strongly recommend that an important part of the research resources of the Transportation Department be allocated to further and expanded work in evaluation of socio-economic

impacts of transport in rural areas. It seems highly desirable that a very significant part of the proposed research program be approached multisectorally. For these reasons, we propose that this line of research be pursued in three different ways:

a) continuing and completing the present socio-economic impact studies undertaken in the Transportation Department;

b) launching in this Department a limited set of new research topics in rural transportation;

c) cooperating with the Agriculture and Rural Development Department in a broad based research program geared at the in-depth observation and analysis of the socio-economic impacts of rural infrastructure (construction and operation); we recommend that this program be implemented by a multidisciplinary task force.

3.41 Cooperative Research on the Socio-Economics Impacts of Rural Infrastructure: Numerous testimonies have been collected on the desirability of such a program, through meetings with Bank's staff and executives (CPS and Regions) in various sectors. A member of the panel was deputed the specific mission of exploring the subject with representatives of the Agriculture and Rural Development Department. Following these meetings a broad consensus was reached on the interest of the subject, its researchability and the principle of proposing to the Bank management the organization of a cooperative task-force. The main aims of the suggested long-term program proposed would be:

- to explore the subject in depth in order to learn the lessons of previous experience in a systematic way;
- to identify all the relevant factors (social, economic and political);
- to organize them so that they can be given relative weights;
- to detect the main interrelations between groups of factors;
- to better relate strategic decisions and objectives concerning Rural Development (in a given area) and implementation of infrastructure.

A "Tentative Guideline for a Research Project on Socio-Economic Impacts of Rural Infrastructure" has been prepared by a member of the panel.

3.42 For the organization of the program, the panel does not want to propose a particular solution, but it stresses the necessity for the Bank of planning extensive work in this area, deciding the right organizational framework, committing the necessary financial and staff resources and starting work as soon as possible.

3.43 On-going Research: In the light of what has been said before, it seems essential that the Transportation Department receive the necessary resources for continuing the on-going research on rural roads. This would contribute to the broader program outlined above. It should include dissemination and improvement of operational tools like the RRPACK; development of appraisal methodology and preparation of a Rural Roads Handbook; follow-up on the Socio-Economic Impact Study in Brazil (a nationally supported project initiated in connection with a Bank loan); methodological approaches like those on the institutional aspects of rural roads and on the practical problems faced by transport service enterprises in the rural areas, including an assessment of the quality of service provided by the transport industry.

3.44 Follow-up Studies in Ethiopia and YAR: It seems wise to provide resources for implementing Phase II (the "after" study) in the two cases of rural roads in Ethiopia and the Yemen Arab Republic: otherwise, much of the potential benefits of the very innovative Phase I would be lost.

3.45 Rural Transport Needs: In line with the on-going research on transport services, it seems logical to do more work with a view to understanding the transport needs of rural populations and the socio-cultural determinants of their desire for mobility at different levels of accessibility and development. At present, lack of empirical data in this area forms one of the major constraints on the development of simple, analytical tools in evaluation of rural roads. Feasibility studies for large transport projects typically develop traffic counts and forecasts for "with" and "without" project situations. For major highway projects where the investment is substantial, this can be done individually for each project. For low-cost rural road projects such individual studies are seldom feasible, because they would become disproportionately expensive as well as logistically very difficult to implement. What is required are some means of forecasting traffic which are simpler and easier to apply (for instance to groups of roads of similar characteristics rather than to individual sections) yet which, at the same time, take adequate account of the critical local behavioral patterns. While freight traffic is relatively more easily predicted based on current and future economic activity in the road influence area, there is little basis for estimates of passenger travel demand. At present, not even order-of-magnitude estimates of differences in personal mobility of rural populations are available. Results from the few relevant studies undertaken (such as the socio-economic impact studies mentioned above) indicate that actual personal mobility in less developed societies may be only a fraction of that in developed countries, 1/ and that response to improved accessibility is quick and dramatic, while production effects may take somewhat longer to materialize. The proposed study would provide the basic information needed to link relative mobility levels to accessibility or overall level of development in particular rural areas. Such information would help considerably in planning the proper standard and timing of investments.

1/ There is some evidence which indicates that, on an annual basis, personal mobility may be up to 150 times more in developed than in less developed societies.

F. Multimodal and Other

3.46 Methods and Processes of Deregulation: As a follow-up to earlier research work on road and port pricing and trucking industry regulation, and in the line of bringing the results to greater operational applicability, analysis is needed of the problems and advantages actually experienced in deregulating transport industries and introducing more competitive pricing. The current experience of the United States in deregulating airlines, trucking, and, to some extent, shipping, would be analyzed for its implications for developing countries, both direct and as a parallel, and experience in some other particular cases -- e.g., railway freight and inter-urban bus services in Brazil, trucking in Kenya and Korea, railways and trucking in England, inter-state trucking in India -- would be reviewed for its lessons, with special focus on the institutional and operational side.

3.47 Social Transfers through Transport Pricing: The pricing and subsidies policies, which the Bank is often called to advise upon, could be approached through models of transfer of benefits and costs (including nuisances, etc.) between different social groups; transport being as it seems, and in contrast to traditional Bank policy advice, one of the favorite tools of the governments to operate voluntarily or unwillingly such transfers.

3.48 Country Motorization Policies: Analysis is needed of the widely differing experiences among countries regarding the development of the private automobile as a means of transport, with assessment of the advantages and disadvantages of alternative restrictive policies on growth of private cars. This would enable the Bank to better assess countries' overall transport development strategies and strengthen its advice on taxation, promotion of public transport alternatives, subsidization, etc.

3.49 Appropriate Vehicles for Rural Development: Following the very good response from numerous developing country institutions to the compilation of a catalogue on "Appropriate Technology in Rural Development: Vehicles Designed for On and Off Farm Operations" 1/, further work should be done on updating and expanding the catalogue on the basis of comments and data received from various sources in developing and developed countries. Also, the case for possible Bank support of research on further development and on small scale production of such "appropriate vehicles" should be examined.

3.50 Land-Use and Spatial Development Aspects of Transport Infrastructure: The formative, if not dominating, impact of transport infrastructure investment on the spatial patterns of a country's development and geographical population distribution has been increasingly recognized in recent years and raises a question whether traditional methods of transport investment appraisal emphasizing internal efficiency of the particular transport mode may not sometimes produce misleading results by neglecting the external economies and diseconomies that result. This is a matter of application of

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1/ Transportation Department, April 1978.

the regional development approach, which the Bank has fostered for limited rural areas, to the macro-scale and could be particularly important for countries which face large fundamental decisions on the pattern of their spatial development over the next 20-30 years.

3.51 International Road Transport: A more comprehensive approach should be developed to the many aspects involved in development of road transport services between countries, including administrative aspects (such as insurance, licensing customs), engineering (highway design standards, road signs and driving rules) and broader economic and commercial questions. This is an area where the Bank has sometimes participated in financing particular infrastructure investments (with mixed pattern of results) but has not taken a broader approach. It is receiving particular attention in Africa now in the form of the African Transport and Communications decade 1978-88. The Transportation Department has identified a particular potential for preparing a comprehensive inventory of future possible integrated projects involving both mining or industry and international transport development, as a means to help promote project preparation and planning in a way to expedite achievement of better inter-African links. Pursuit of this good idea will take more resources for collection and analysis of information.

3.52 Freight Transport Chain: This is a model for analyzing transport by commodity from its point of origin as a raw material through all intermediate marketing, warehousing and processing stages to final distribution as a finished good, with a view to minimizing costs and identifying bottlenecks and any points of excessively high prices. A study applying and testing the model would be very useful in a broader approach to transport, and in support of general Bank policy concerns such as promotion of developing country export earnings and in connection with the containerization issues.

3.53 Domestic Regional Aviation: In addition to the very useful work in developing new broader methods of socio-economic analysis of rural road projects which was started in the 1970s, special subsidiary effort, adopting the same broad framework, is needed for analysis of domestic regional aviation as an alternative to roads, since the overall review of Aviation's Role in Development, which the Transportation Department has been doing, and experience in many countries suggest that this may be an area of potential in particularly remote parts of much of the developing world. Where the provision of some form of transport access would be generally accepted as essential from an administrative and social point of view, even though it cannot for the moment be in any way financially viable, air transport may have lower total costs (capital in form of both infrastructure and vehicles, plus maintenance and operational costs) than road transport; moreover, air transport may have certain advantages in concentrating development impact in an area, instead of draining it away, as when locally produced materials and crops are taken out by road for processing elsewhere.

3.54 Aircraft Selection Criteria: As a further step in strengthening the attention given to aircraft and air services in Bank work on airport projects, and to respond to felt needs of borrowing countries, a model could usefully be developed for analyzing alternative route structures and configurations for domestic air services to help decide what size and type of aircraft should be purchased. Such models have been developed by aircraft manufacturers, but they need review and consolidation by a more neutral source, with particular emphasis on the parameters important to developing countries.

3.55 Energy Aspects of Alternative Transport Modes and of Different Technologies within Modes: More work should be done to bring together available information in this field (comparing, for instance, the relative energy efficiencies of rail vs. road vs. air; diesel vs. electric power; gasoline vs. alcohol vs. air cushion; airplane vs. airship, etc.). This research should be done in close coordination with the Energy Unit in the Energy, Water, Telecommunications Department.

3.56 Risk Analysis Case Studies: Work on this subject would build on earlier Bank efforts in this field with a view to developing an operational methodology to better handle engineering, economic and social risks in transport project evaluation.

3.57 Compendia of Cross-Country Comparative Statistics: There would be considerable interest, both inside and outside the Bank, in more compilations of transport statistics for wide ranges of countries, on subjects such as:

- share of transport investment in total budget
- per kilometer cost of construction and maintenance by type of road
- kilometers of road/capita by country and sub-regions
- vehicles/capita by country and sub-regions
- vehicle fleet composition
- vehicle operating costs by vehicle type
- productivities (e.g., of port gangs, road construction gangs)
- utilization rates (e.g., of construction equipment/railroad equipment)
- modal splits for passengers and freight and their evolution over time
- availability and utilization rates for different items of road maintenance equipment

We are somewhat surprised to find how very little of such work the Bank has so far been able to do, despite the unique wealth of information to which it has access.

IV. RECOMMENDATIONS AND FUTURE PROGRAM

A. General Recommendations

4.01 Besides the preceding rather long list of subjects which we have compiled and which we think merit close consideration for inclusion in the future research program, we would like to convey general impressions which emerge from the many discussions we have had, both internally as a panel and with Bank staff from many different offices.

4.02 The key issue seems to us to be how to make best use of the rather particular comparative advantages of the Bank's Transportation Department, as it is and as it could be, for doing reseach that can help the Bank's member countries. The fact that the Bank is such a highly operational organization, compared for instance with most other international units or organizations concerned with transportation, means that the Bank is in a unique position to sponsor and undertake research that is (i) highly relevant to investment and operating decisions, (ii) based on actual experience in a wide range of countries, (iii) directly linked with the development of management and analytical capacities in the developing countries, and (iv) applied relatively quickly to the actual practice of development through Bank-assisted projects and Bank advice on transport policies. All of these faculties depend on the basic constitution of the Bank as a cooperative organization communicating in trust with a large number of countries, developed and developing, on concrete policy and investment decisions. The Bank is in a sense the nucleus of a special type of communications network.

4.03 As the hub of such a communications network, the Bank has a special responsibility to draw its members' attention to research done in other countries that is relevant to their problems or research that needs to be done to respond to those problems. This communication functions in several ways -- through Bank staff advising individual countries on particular investment projects and policy problems, through active Bank participation in international meetings on transport and transport research, through Bank contacts with transport research organizations in developed countries on subjects relevant to the developing world that need to be researched, and through Bank assistance to developing countries in organizing meetings with international participation to discuss and analyze their own operational experience and research results. Action has been fairly steady along all those lines. But it has sometimes been suggested that the Bank should take more of a leadership role, organizing international transport research meetings or preparing a draft international agenda of transport research priorities for the developing world. We believe that the quieter role, particularly encouraging and supporting initiatives by developing countries individually, or in groups, as those initiatives emerge, is the right course and should continue to be pursued.

4.04 It means that it is even more important for the Bank to know about transport research going on elsewhere than to undertake such research itself, and that the Bank needs to use much more research than it would itself produce. This seems to be the point underlying the fact that quite a lot of the topics listed in the preceding pages require more 'state-of-the-art' or 'survey' papers or practical notes, adjusted to Bank needs and situation, and written for busy operational staff, rather than deeper, original research. The same point is manifested in the Transportation Department's effort to develop a 'Transportation Resource Person' system for the Bank as a whole, whereby Bank transportation specialists, in whatever department, would take some special responsibility to keep abreast of work going on outside the Bank in areas of special interest to them, and to brief colleagues elsewhere in the Bank upon request. The apparently large current demand among Bank staff for review papers and advice of this sort may reflect a feeling that staff have been too busy operationally to keep up sufficiently with outside work. In some organizations such work would not be considered research, but it seems clear that at least in the Transportation Sector in the Bank it does not get done except under the broad heading of research, and we see nothing wrong with so entitling it there.

4.05 But there are also some other common elements and themes that seem to emerge in the list of topics and in our discussions about how they might be handled, and that relate to the type of research that the Bank itself should undertake or sponsor. A recurring theme in our own assessments of the past projects, and in many of the proposals for further work, is the need for more attention to both institutional aspects (or what might be called the non-economic aspects of management) and to social aspects: how to make labor-intensive construction programs, or economic deregulation of transport, or highway maintenance programs, or port efficiency improvements, actually work in practice; and how to maximize desirable social impact of rural roads, or labor-intensive construction, or rural aviation, or transport pricing. Another notable point is what a relatively significant proportion of the new subjects suggested for research effort fall into a category that might be called "general framework" representing generally fresh approaches to the transport sector in a fairly broad sense, rather than a detailing of a particular method or aspect of project analysis; this may reflect in part not only the Bank's broadening view as to what criteria are appropriate to take into account in project assessment (various social measures, etc.) but also the Bank's need, with the new type of 'sector lending' that it is undertaking in transport, to advise countries on broader issues than often handled in the past.

4.06 We have also noted the stress placed by many of the Regional operating staff of the Bank on their desire to know more fully and more quickly not only about innovative projects or project-aspects developed by a particular Region, but also about how those innovations, or indeed special initiatives in transport outside Bank projects, work out in practice; such case-material is very important both for developing and for selling Bank policy. And a final common element is the link that needs to be made between research and the training and development of borrower management and local consultant capabilities, whether in ports or in connection with the labor-capital substitution study or on rural roads monitoring.

4.07 This matter of borrower staff training seems to us to be one of the most important aspects of the dissemination question. Dissemination, both by the researchers themselves and by the Bank staff more generally, is now clearly the priority task for most of the major research projects undertaken in the past -- particularly the Highway Design and Maintenance model and the Labor-Capital study -- and some of the smaller projects. The Transportation Department could usefully take further initiatives to assist dissemination -- put more emphasis on simple operational tools of all sorts as the highest-priority output of research work, circulate such tools even before they are fully perfected and produce expeditious revisions in light of practical experience, make use of a standard mailing list of country transport planning units for regular distribution of Bank papers of general interest in the transport field, and possibly work even more than in the past with the EDI as a channel for dissemination of research results.

4.08 The main lesson of past experience seems to be that much the most useful form of dissemination is not mere production of bulky user-manuals but direct work, preferably by the research staff themselves in cases of any significant complexity, with staff from the borrower organizations -- such as was done last year in connection with transfer of the Highway Design and Maintenance model to Bolivia and Brazil and on labor-intensive construction with the Philippines, Haiti and a number of other countries. Such ad hoc demonstrations, or cooperative endeavors, seem invaluable. And the corollary is that they should be followed up over time, so that improvements made to the Bank-originated models and approaches by the borrowing organizations will be reviewed and re-incorporated into the Bank's own version wherever such improvements would seem to be of wider relevance. This would appear to be the way to "multiply the results" of the Bank's research efforts.

4.09 We also feel that dissemination could be assisted in the future by fuller involvement of developing countries' agencies (operating agencies and consultants at least as much as, and probably more than, research institutions) in the earlier stages of the research; or to put the point in another broader way, that the Bank's comparative advantage in transport research could be more fully realized by a better symbiosis between the Bank's own research efforts and the planning and policy studies that the Bank often encourages its borrowers to undertake with aid of loan/credit financing. Such studies -- on port pricing and accounting, road network planning, maintenance organization, trucking regulation, road user charges, monitoring of rural road construction techniques and socio-economic impact, railway accounting and costing, railway line and service closures -- respond directly to important operational needs. We have the impression that, although the Bank has generally advised on terms of reference and initiation of such studies, difficulties have often been encountered in getting them underway -- and even more in getting expeditious action on their conclusions, once reached. Sometimes such studies do not appear to have followed the best methods, and in other cases considerable resources appear to have been spent on consultant effort to develop models closely paralleling something that might have been prepared for more general application -- barring slight adaptation to particular country circumstances -- by the Bank itself.

4.10 It obviously could not be expected that all such studies would correspond to a current active research interest in the Bank, nor that all such current research interest would correspond to borrower studies. But we feel that there should be more scope than filled in the past for the research staff to contribute to improving such operational studies and for the studies to contribute in turn to broadening the base of research results (if with a little delay) and developing local capacity to put Bank research results to beneficial use.

4.11 While some of the suggestions in the preceding pages -- the 'Resource Person' system, use of a mailing list of country transport planning units and a better tie-in between research and loan/credit-supported studies in borrowing countries -- could serve to amplify the Bank's capacity for handling research even with present resources, we would be doing a disservice not to make abundantly clear the overall implication of our findings, that more staff-resources are needed to properly realize the Bank's comparative advantage in transport research. Even some of these steps have been held up so far by staff-shortages, and most of the suggestions we have made -- more 'state-of-the-art' papers and research communication role, more active and ad hoc dissemination and follow-up of research results, more specialist advice to borrowers on operational studies that relate to subjects of Bank research, more gathering and feed-back of comparative information about innovative projects -- clearly depend for their implementation on Bank staff resources, rather than consultants or Research Budget funds. The Transportation Department has been spending a total of some 6-7 staff man-years per year on the type of research (including 2-3 man-years on policy related research) which we have covered in our review, and we have some doubt, for instance in connection with the Highway Design and Maintenance research, as to whether the staff-resources were not spread a little too thin; more concentration of effort might have brought somewhat earlier pay-off.

4.12 On the other hand, valuable and useful as we think the studies and research we have earlier listed at such length would be, we would not want to give the impression that we recommend a build-up of staff to cover all these subjects adequately within the next few years. Even with more staff-time devoted to active dissemination, and more involvement of borrower agencies in the research itself, there is clearly a limit to the absorptive capacity of Bank operational staff and borrowers for Bank research results, hard as it is to identify precisely where that limit is; and there is a limit to the number of areas of emphasis that the Bank transportation staff as a whole can usefully pursue in any one period. We suspect that an appropriate effort for the immediate future might be to raise the man-years devoted to the research and policy work from its recent 6-7 to about 10-11, probably in two steps spread over the next two-three years. This would mean an annual increase of the staff of the Transportation Department of about 6-9% per year, which we recognize to be difficult for the Bank to accomplish under present severe budgetary constraints but nonetheless consider extremely worthwhile from the point of view of transportation development in the Bank's borrowing countries.

B. Future Programs and Priorities

4.13 The fundamental guiding principle of Bank transportation research is that it be addressed to help solve significant transportation problems of developing countries. This principle has served well to give purpose and focus to the work undertaken in the past and continuing today. In planning future research every effort must be made to anticipate key problems of the future. Among the key issues for the 1980s one can foresee today are:

1. Maintenance of the large highway networks that have been built up;

2. Financial situation of the railways and the fiscal burden of deficits;

3. Energy problems: cost trends, security of supply, pollution, etc.;

4. Relationship between major transport policies and infrastructural development, on the one hand, and spatial allocation of population and economic activity on the other;

5. Support for international trade expansion: ports and shipping;

6. Designing rural projects for optimal social and economic impact;

7. Organizational, administrative and operating efficiency of transport agencies;

8. Development of efficient domestic construction capacity.

4.14 Within these general perspectives the Panel has given serious attention to the priorities and prospective resource claims of specific research topics over the next five years. The results of these deliberations are summarized in Table 2 in terms of man-months of Bank staff and external manpower. It is, of course, difficult to predict five years into the future with precision, and it is essential that the Bank should maintain flexibility and be prepared to revise priorities in light of possible future developments. Nonetheless the long history of transportation research and its close relation to Bank operations makes it possible to plan ahead with a rather larger element of confidence than may be the case in other sectors.

4.15 Over the next five years the program composition and resource allocations should in fact be altering markedly as the large research projects on highway standards and civil construction technology, which have absorbed the major effort in recent years, are completed and a much broader new program of small and medium scale studies in railways, ports, shipping and aviation, some of which have already been initiated, is

Table 2: PROPOSED TRANSPORTATION RESEARCH PROGRAM, FY 79-83
(Man Months: Staff-External-Total)

	FY 79	FY 80	FY 81	FY 82	FY 83	Total FY 79-83
CONTINUATION ON-GOING RESEARCH						
I. Highway Design & Maintenance Standards						
1.1 HDM Model Modifications	1- 8- 9	4- 2- 6	4- 2- 6	1- 0- 1	1- 0- 1	11- 12- 23
1.2 HDM User's Manual	1- 2- 3	1- 0- 1	1- 0- 1	1- 0- 1		4- 2- 6
1.3 HDM Applications	3- 0- 3	4- 0- 4	5- 0- 5	3- 0- 3	2- 0- 2	17- 0- 17
1.4 HDM Seminars & Training	1- 0- 1	2- 0- 2	1- 0- 1	1- 0- 1	1- 0- 1	6- 0- 6
1.5 Brazil HDS Supervision	2- 0- 2	4- 1- 5	1- 1- 2	1- 0- 1	1- 0- 1	9- 2- 11
1.6 India HDS Supervision	3- 1- 4	3- 0- 3	3- 1- 4	2- 1- 3	2- 1- 3	13- 4- 17
1.7 Simplified VOC models/applications	1- 0- 1	1- 0- 1	1- 0- 1	1- 0- 1		4- 0- 4
1.8 Revised "Quantific'n Rd. User Savings"		1- 4- 5	1- 4- 5	1- 4- 5		3- 12- 15
1.9 Book: Highway Design/Mtce. Economics				4- 1- 5	7- 1- 8	8- 2- 10
1.10 Highway Mtce: Problems & Policies	6- 3- 9					6- 3- 9
	18-14-32	20- 7-27	17- 8-25	15- 6-21	14- 2-16	84- 37-121
II. Substitution of Labor in Construction						
2.1 Handbook	4-12-16	2- 1- 3				6- 13- 19
2.2 Projects: Identification & Preappraisal	2- 3- 5	4- 2- 6	4- 2- 6	4- 1- 5	3- 1- 4	17- 9- 26
2.3 Projects: Design & Implementation	2-10-12	3-12-15	4-12-16	3-11-14	2- 6- 8	14- 51- 65
2.4 Evaluation of Demonstration Projects			2- 2- 4	4- 4- 8	3- 6- 9	9- 12- 21
	8-25-33	9-15-24	10-16-26	11-16-27	8-13-21	46- 85-131
III. Ports and Shipping						
3.1 Port Pricing: Case Studies	2- 3- 5	3- 6- 9	2- 3- 5			7- 12- 19
3.2 Port Pricing: Operational Report			1- 0- 1	4- 0- 4	2- 0- 2	7- 0- 7
	2- 3- 5	3- 6- 9	3- 3- 6	4- 0- 4	2- 0- 2	14- 12- 26
IV. Railways						
4.1 Economic Role of Railways I	7- 0- 7					7- 0- 7
4.2 Economic Role of Railways II		5-15-20	6-15-21	8- 4-12	2- 0- 2	21- 34- 55
4.3 Railway Model Development	2-10-12	2- 4- 6	2- 1- 3			6- 15- 21
4.4 Railway Model Applications			2- 0- 2	2- 0- 2	2- 0- 2	6- 0- 6
4.5 Railway Training Issues		1- 5- 6				1- 5- 6
	9-10-19	8-24-32	10-16-26	10- 4-14	4- 0- 4	41- 54- 95
V. Rural Roads						
5.1 Appraisal Methodology Ext'ns & Applic'ns	1- 0- 1	2- 0- 2	2- 0- 2	2- 0- 2	3- 0- 3	10- 0- 10
5.2 Brazil Feeder Road Studies		1- 0- 1	2- 0- 2	2- 0- 2	2- 0- 2	7- 0- 7
5.3 Institutional Aspects Feeder Roads	10- 0-10	4- 0- 4				14- 0- 14
5.4 Rural Transport Services	3- 0- 3	4- 4- 8				7- 4- 11
5.5 Rural Roads Handbook			6- 0- 6			6- 0- 6
	14- 0- 14	11- 4-15	10- 0-10	4- 0- 4	5- 0- 5	44- 4- 48
VI. Multi-modal						
6.1 African International Projects	1- 0- 1	1- 1- 2	3- 5- 8			5- 6- 11
TOTAL	52-52-104	52-57-109	53-48-101	44-26-70	33-15-48	234-198-432

Table 2 (contd..) PROPOSED TRANSPORTATION RESEARCH PROGRAM, FY 79-83
(Man Months: Staff-External-Total)

	FY 79	FY 80	FY 81	FY 82	FY 83	Total FY 79-83
NEW PROJECTS						
I. Highways						
1.11 Highway Safety Problem	2- 2- 4	3- 3- 6				5- 5- 10
1.12 Road User Charges	5- 2- 7	6- 5-11	2- 0- 2			13- 7- 20
1.13 Bus/Trucking Regulation/Organization			3- 2- 5	8- 6-14	2- 0- 2	13- 8- 21
1.14 Misc. Tech. Guidelines			1- 3- 4	1- 3- 4	2- 4- 6	4- 10- 14
	7- 4-11	9- 8-17	6- 5-11	9- 9-18	4- 4- 8	35- 30- 65
II. Construction Industry						
2.5 Study Selected Countries	1- 1- 2	3- 4- 7	4-11-15	4- 0- 4		12- 16- 28
2.6 Review Paper: Constrn. Ind. Dev.		7- 6-13	2- 0- 2			9- 6- 15
	1- 1- 2	10-10-20	6-11-17	4- 0- 4		21- 22- 43
III. Ports and Shipping						
3.3 Ocean Shipping Potential	8- 2-10	6- 5-11				14- 7- 21
3.4 Port Management Problem		1- 0- 1	6- 6-12	3- 0- 3	2- 0- 2	12- 6- 18
3.5 Ports & Regional Development			1- 0- 1	8- 6-14	3- 0- 3	12- 6- 18
3.6 Coastal Shipping Potential				2- 0- 2	8- 8-16	10- 8- 18
	8- 2-10	7- 5-12	7- 6-13	13- 6-19	13- 8-21	48- 27- 75
IV. Railways						
4.6 Comparative Costs Rail/Other Modes		1- 0- 1	4- 6-10			5- 6- 11
4.7 Practice in Service Reductions/Closures			6- 6-12	2- 0- 2	2- 0- 2	10- 6- 16
4.8 Electrification vs. Dieselization				3- 4- 7		3- 4- 7
4.9 Equipment Maintenance/Utilization					6- 5-11	6- 5- 11
4.10 Railway Information Systems					5- 4- 9	5- 4- 9
4.11 Misc. Technical Topics	1- 1- 2	1- 1- 2	1- 2- 3	1- 2- 3	1- 2- 3	5- 8- 13
	1- 1- 2	2- 1- 3	11-14-25	6- 6-12	14-11-25	34- 33- 67
V. Rural Transport						
5.6 YAR Feeder Roads: Phase II				2-26-28	2-10-12	4- 36- 40
5.7 Ethiopia Feeder Roads: Phase II				2-14-16	2-12-14	4- 26- 30
5.8 Rural Transport Needs			2- 6- 8	2- 8-10	2- 5- 7	6- 19- 25
5.9 Domestic Regional Aviation			5- 3- 8	4- 1- 5	2- 0- 2	11- 4- 15
			7- 9-16	10-49-59	8-27-35	25- 85-110
VI. Multi-modal and Other						
6.2 Process of Deregulation			2- 0- 2	8- 6-14	5- 4- 9	15- 10- 25
6.3 Spatial Implications of Transport Projects			1- 0- 1	3- 0- 3	9-10-19	13- 10- 23
6.4 Social Transfers by Transport Pricing				2- 0- 2	2-10-12	4- 10- 14
6.5 Freight Transport Chain					5- 5-10	5- 5- 10
6.6 Risk Analysis Updating					2- 0- 2	2- 0- 2
			3- 0- 3	13- 6-19	23-29-52	39- 35- 74
TOTAL	17- 8-25	28-24-52	40-45-85	55-76-131	62-79-141	202-232-434
COMBINED TOTAL	69-60-129	80-81-161	93-93-186	99-102-201	95-94-189	436-430-866
Contribution to Rural Infrastructure Research Program		4- 0- 4	9- 0- 9	10- 0-10	15- 0-15	38- 0- 38
GRAND TOTAL	69-60-129	84-81-165	102-93-195	109-102-211	110-94-204	474-430-904

expanded. More attention will also be given to preparation of expert 'state-of-the-art' surveys in many areas to ensure that results of the much larger volume of research being done outside the Bank is made available to Bank staff and borrowers alike.

4.16 The first claim on resources is for the dissemination and implementation of the results of the very large studies on highway design and maintenance standards and civil construction technology, now largely completed. Without substantial efforts to assist Bank staff and borrowers alike it is clear that the fundamental findings and new tools of analysis developed by these major studies would be implemented only very slowly, if at all, and the rapidly growing number of requests for assistance in this respect should not be ignored. Of similar importance is the recently initiated study on the economic role of railways, a traditionally important but much troubled sector of Bank lending; research is urgently needed to help formulate future Bank railway lending policies.

4.17 Largely because of the very high priority we attach to the numerous relatively small research jobs listed plus dissemination work, and hence to provision of the necessary staff for this, we would recommend a very selective approach to new, more innovative and ambitious undertakings of the scale of the earlier Highway Design and Labor Capital Substitution studies. Phase II of the study of the Economic Role of Railways may well be a fairly large undertaking in its own right. Hence new initiatives should probably be limited only to areas of very high potential pay-off and broad relevance. There are several topics which would seem likely to fall in that category -- such as Processes of Deregulation and Spatial Development Aspects of Transport Infrastructure Development -- and others which may well do so after preliminary work has been done on them.

4.18 Clearly, however, there is a very high priority claim for new large-scale, long-term research in studying the socio-economic impacts of feeder roads and other rural development measures. The pioneering work done in the feeder road impact studies in Ethiopia, Yemen Arab Republic and particularly Madagascar have clearly demonstrated that the subject, although complex, rewards research provided that proper care is taken to assemble a sound primary data base for before as well as after conditions along with concomitant controls. Eloquent testimony was heard from the Projects Department Directors that they considered the existing basis for predicting the impact of rural development projects to be inadequate and in need of strengthening for planning of new projects. We note too that our companion panel for that sector, RAPARD, has also emphasized the importance of a better evaluation of the Bank's experience in this relatively new but largest of all Bank lending sectors. It is clear that more rigorous, deeper evaluation of the Bank's experience in rural development is warranted. Drawing lessons from experience of the Bank's monitoring and evaluation efforts and various studies such as the African Rural Development Survey as well as the Transportation Department's Feeder Road studies, we can only conclude that a large, sustained effort over at least 8-10 years will be required including at least some direct support by the Bank to the primary

data collection effort which would largely be executed by local institutions. In Table 2 above we have made allowance for 1 to 2 man-years of transport/ regional development specialist assistance as a contribution to a much broader effort which would perhaps most logically fall under the leadership of the Agriculture and Rural Development Department within the Bank, but would also include major efforts by local institutions. We see no shortcuts or easier avenues if we are to gain truly better insights into the process of rural change and the impact of Bank rural development investments on human welfare.

4.19 The recommended program of transport research implies an increase over three years of three Bank staff (from the current approximate seven man-years per year) plus one or two additional transport staff in support of the proposed broader study on socio-economic impacts of rural development projects. The Panel notes that this increase does not permit undertaking all of the recommended topics discussed in Chapter III within the 5-year horizon considered. If even this modest increase should be reduced, then it would be necessary to delay corresponding portions of the new research projects (shown on page 2 of Table 2), as paramount priority must be attached to completion of the major ongoing projects and dissemination of their findings. Our extensive discussions with Bank operational staff in many departments underscore the pointlessness of undertaking research without follow-up effort to ensure utilization of research findings.

APPENDIX I

I. Transport Research Review Panel Members

APPENDIX I

World Bank

Transport Research Review Panel

Chairman: Jorge Cauas (Chile): Mr. Cauas was born in 1934 and educated at the University of Chile as a Civil Engineer and subsequently at Columbia University as an Economist. He has recently returned to Chile where he is currently in private business and part-time in academia. Prior to his recent return he was the Chilean Ambassador to the United States. He has also held posts with the Chilean Government as the Minister of Finance and the Governor of the Central Bank and previously as Director of the Economic Institute at the Catholic University of Chile. From 1972 to 1974 he was employed at the World Bank as the Director of the Development Research Center. He was formerly on the board of the Econometric Society.

Dag Björnland (Norway): Currently Director of the Institute of Transport Economics (Oslo), Mr. Björnland was born in 1935 and trained in mathematical economics at Oslo University. Previous to joining the Institute he was engaged in national economic planning and budgetting in the Central Bureau of Statistics. He has been with the Institute of Transport Economics since 1965 specializing in long range transportation and regional planning, modelling, pricing and benefit-cost analysis, and most recently in the development of research policy and implementation. He was appointed Director of the Institute in 1977.

Ing. Rodolfo Felix Valdez (Mexico): Currently Sub-Secretary of the Ministry of Human Settlements and Public Works, Mr. Felix was trained as a civil engineer. He has previously served as Chief of Planning for Public Works with an overview on the entire transport sector including all modes. Among many other responsibilities, Mr. Felix oversees the largest labor-intensive rural roads program in the world.

Goon Kok Loon (Singapore): Currently Secretary of Administration of the Port of Singapore Authority; Mr. Goon has also worked for a number of years in the field of port operations. He originally trained as an electrical engineer in the port for 5 years. Subsequently, he proceeded to the Massachusetts Institute of Technology for training in transportation systems analysis with the Department of Ocean Engineering.

S. Jagannathan (India): Now retired from the Indian Civil Service and Chairman/Director of some public and private sector companies, Mr. Jagannathan previously held the posts of the Financial Commissioner of the Indian Railways, Permanent Secretary, Ministry of Finance/Department of Economic Affairs, Executive Director of the World Bank and Governor of the Reserve Bank of India, among others. He studied at the London School of Economics.

Daniel L'Huillier (France): Currently Professor of Economics and Director of the Center for Transport Economics Research at the University of Aix-en-Provence; among other interests Mr. L'Huillier has pursued research on the impact of transportation on regional development. He has had extensive experience in many African and other developing countries dealing with transportation, management, economic development and other issues.

APPENDIX II

II. Project-by-Project Review

PROJECT BY PROJECT REVIEW

A. Highway Design and Maintenance Standards

Timing and Budgetting

1. The work was initiated in 1969 and has now been running for nearly ten years. A computer program and user's manual will be published in the near future to guide the choice of investment and maintenance policies. Over the years, modelling and data collection have been going on steadily, finally coalescing into the Highway Design and Maintenance Standards Model (HDM). The model is at present restricted to freely flowing traffic conditions.

2. Bank expenditure so far is approximately $650,000 and input from staff-members some 10 man-years; much larger sums have been provided in complementary efforts by the Government of Kenya, India and especially Brazil. Compared to investment in highways, the amount is trifling. The need for this research has been evident and it appears justified that approximately 1/3 of all transport research expenditures by Bank and collaborating institutions has been channelled into this field. One point may, however, be made. When the discount rate is high, it pays to concentrate the construction period. The same applies to research, which should not be too time-consuming; perhaps it would have been preferable to put in earlier a larger staff effort than the average of only slightly more than one staff man-year per year of work. Moreover, the longer the modelling period, the more tempting it will be for the model builder to add new insight and refinement onto the existing frame-work before turning it into an operational tool.

3. It may be noted that the Bank took on research in highway design and maintenance rather late. The need to do such work surely must have arisen some ten years earlier, when highway lending dominated Bank project work. The lesson to be learned is for the Bank to be ahead of the problems in its research efforts.

Professional Accomplishment

4. The Bank and its collaborating partners have done an excellent piece of applied research. The relevant economic theory has been known for many years, but the Bank has managed considerably to bridge the gap between what theory says and what reality can supply in the form of operational equations, variables and parameters. An impressive amount of literature is available for the reader if he or she wants to pass a thorough judgment. The panel draws attention to a few points in particular.

5. The Kenya data on road deterioration and user costs (physical units) may reflect the particular practice of that country. For example, the Kenyans may be better or worse in keeping a car or a road maintained than other people. Further evidence, e.g., as now being collected from Brazil and India, will shed light on the problem of how representative the Kenya base in fact is.

6. On a-priori grounds, the researcher may want to include a long list of variables in both the road deterioration and the user costs relationships. As often happens in social science the researcher for several reasons is not able to isolate all that many factors of influence. The weight of non-recorded factors will then in practice be borne by those which have been significantly identified. Whether factor mix and parametric values vary over time and between countries remains to be seen. Proper identification is also a question of money. It may simply cost too much to know more of additional factor influence. Since research is going on in Brazil and India, more insight may, however, still be gained.

7. The relationships used at present, both on road deterioration, speed performance and user costs already contain an impressive amount of information. HDM may be looked upon as a tool for analyzing total road transport costs, i.e., construction plus maintenance plus road user costs as a function of the road design and maintenance standards. For this end it is an efficient tool, especially when many road segments and policies are considered together.

8. Using the model, the Bank has discovered that it pays high dividends to increase road standards from very low levels to somewhat higher levels. From then on, increased benefits tend to be offset by increased maintenance and construction costs. Another way of formulating this experience is to say that the range of optimal solutions is rather wide and the decision criterion less useful once a certain level of road standard has been attained. This experience is not restricted to developing countries alone; it applies, for example, to Europe as well. Its policy implications are profound.

9. To sum up, at least three very useful applications of HDM are evident. HDM can help both to identify substandards that need to be improved and costly "demonstration" projects, that do not merit realization. It also sheds more light on the importance of proper maintenance as contrasted with construction costs.

10. In applying the model, the user must specify values for a great number of exogenous variables. The less is known of these magnitudes, the less it pays to invest in costly model building. The tentative conclusion may be set forward that, when the Brazilian and Indian experience is incorporated into HDM, it is at least debatable whether it will pay to continue building up the model. Simplification may then be needed.

Adaptability to Varying Conditions

11. To the Bank it will be crucial whether the model can be applied successfully to a range of climatic, economic, geographic and national conditions. It has already proven very useful for Bank-financed projects in several countries, including Chad and Bolivia, as well as Kenya. But how widely it can be applied without excessive loss of accuracy, still remains to be seen; the Brazilian and Indian experience will be extremely important to this end. Naturally the hope is that there will be some basic, stable relationships across countries.

Ease of Understanding and Use

12. The basic relationships treated in the model have different degrees of complexity. Some are easy, others are extremely hard to understand. As a computer program, HDM requires (as the Bank says itself) several manweeks of effort to learn. Clearly, the Bank should embark upon a program of teaching professional people in the developing countries how to use the model and supply computer programs free of charge. However, a comprehensive model like HDM will never be easy to understand or to use for anybody.

Relevance to Bank Lending Operations

13. The model is relevant to the Bank lending operations. But there is the task of getting the model integrated into appraisal work. This is by no means easy but should be pursued vigorously. The most convincing way is to show that the model can come up with interesting results at less cost than other means, as was done in Chad and Bolivia.

B. Substitution of Labor and Equipment in Civil Construction

General

14. The objective of this research study was to establish the technical and economic feasibility of alternative technologies by considering different combinations of labor and equipment, and to determine optimal techniques for given physical and economic environments.

15. There is no question about the importance of this topic since a high percentage of Bank member countries have abundant labor resources and scarce capital resources that should be used optimally. The desirable strategy would be to determine the range of works for which labor-intensive methods would be a productive and appropriate technology, so that capital resources could be concentrated in those activities where labor would be less productive. The use of labor-intensive methods for suitable projects would also strengthen community involvement, reduce unemployment, promote a more equitable distribution of income and contribute to savings of foreign exchange.

16. The research undertaken has been extensive. Productivity data were collected on a wide range of alternative techniques. In all, more than 7,000 site measurements have been made since 1971 through various phases of the study, the fourth of which is now to be completed. The staff have done a tremendously effective job, especially since they only dedicate a part of their time to research activities. Methodological standards of data collection and analysis were high, involving the use of linear programming and other computerized tools to process the vast amounts of data amassed in the field.

17. While the study evolved through the several phases -- and moved beyond the negative conclusions reached at one point as a result of excessively optimistic assumptions about the efficiency of equipment operations that can be achieved in practice -- the final conclusions may be too cautious regarding the viability of labor-intensive construction techniques. In a large variety of the analyzed cases, labor was not found to be competitive with equipment, in spite of sometimes substantial increases of labor productivity gained by means of improving managerial, organizational and training aspects or by providing workers with more appropriate tools. The engineering-economic analysis was quite correct as far as it went, but it may have been too narrow and too much influenced by traditional engineering skepticism about the effectivenesss of labor-intensive techniques. To address these concerns, the studies were heavily focused on trying to establish, with the greatest precision, what techniques have the lowest cost under given circumstances, and how these costs could be further reduced by better organization, better tools, better training or various equipment modifications, etc. But further consideration might be given to key macro-economic aspects that should certainly influence the decision as to whether or not to use labor-intensive techniques. Among others, income-distribution patterns, unemployment and migration problems, community organization and capacities for doing other similar work, as well as balance of payments considerations would be important. Also, the sheer volume of works that can actually be carried out in developing countries, given the shortage of equipment from which they typically suffer, might be significantly enlarged. Fuller allowance for these aspects, while admittedly difficult to evaluate, would almost certainly have resulted in more strongly positive conclusions regarding the desirability of using labor-intensive techniques in many circumstances.

Consulting Firms and Institutions

18. Referring to performance of consulting firms and other institutions involved in the study, we believe this to have been satisfactory. A large role was played by the consultants in field collection of primary data; this was necessarily so since the Bank is not well situated to do this type of work itself. But we note that many of the main reports were prepared by the Bank staff themselves; perhaps more of the work could have been left to the consultants. We note also that the consultants came largely only from developed countries. The possibility of involving indigenous consulting firms and institutions more heavily should also be examined, because it would enable the Bank to take advantage of the local knowledge of specific problems.

Coordination within the Bank

19. It seems quite important that this particular study should be closely coordinated with departments involved in policy and economic development, agricultural and rural improvements and especially with research related to rural roads. The latter represents a great opportunity for the application of labor-intensive methods, given their characteristically lower construction and design standards, as opposed to those for more sophisticated civil works

such as expressways. Several Bank-assisted projects -- in Kenya, Lesotho, Chad, Benin and Honduras -- have already directly benefitted from the research, and more are underway. But we would expect to see wider applicability.

Dissemination

20. As to dissemination, the plan to elaborate handbooks reflecting the findings of the study and suggesting practical implementation procedures is excellent. Hopefully, such handbooks will be as operational as a good manual should be. Dissemination again could be achieved more effectively if local institutions with technical experience previously achieved were involved in the execution of the study; they would find out, in the process, how to manage a given problem and recognize the main obstacles. The opinion was voiced by the Board of Executive Directors that the "bottleneck" of dissemination is, in fact, the capacity of potential users to absorb research output. If local institutions were involved in the execution of the study, they would in the process learn how to manage a given problem and recognize the main obstacles (administrative, organizational, etc.) that may exist in each case. In other words, the potential users, being in contact with the situation that is being studied would gain experience and become more capable to understand and make use of the research output.

21. In addition, there are other measures to improve dissemination. It would seem that the current dissemination procedure involves the sending of publications either to the financial agency or to the budgetting or programming institution of a given country. Unfortunately, there are some countries where these publications get lost inside these bureaucracies instead of being passed on to interested agencies. A reasonable policy for the Bank that would eliminate this problem would be to send the materials directly to the operating agencies involved, thus ensuring that research results would reach potential users in a timely fashion and that they would be used effectively.

Appropriate Technology

22. Finally, we would like to comment on the main objective of a road investment. A road is designed for communication and, obviously, for transportation purposes. However, communities have different road requirements depending on the different traffic volumes that are to be served. The latter, together with the physical factors, determine the design and construction standards to be applied for any given road. What we are proposing here is that future research on substitution of labor for equipment should consider that the technology to be used in the construction of a road (as well as for other civil works) should be in accordance with the degree of sophistication of the determined standards. The design geometrics and/or materials quality also need to be studied, because they can favor labor over equipment and vice versa; the important point is that standards should be adequate to serve the given level of traffic effectively. It might be useful to undertake a specific collection of data for selected roads built by labor-intensive methods for analysis on the Highway-Design model mentioned above.

23. We would also want to define what we understand by "intermediate technology". Intermediate technology is a solution between labor-intensive and equipment-intensive extremes. It consists of small-scale adapted power machinery utilized to enhance the productivity of unskilled labor. We would like to emphasize that, while improvements in organization and construction procedures are a necessary condition to increase labor's competitiveness, they are not a sufficient one: given suitable design standards as well as adequate materials, intermediate equipment may also be required.

C. Ports

General

24. The Bank has been involved in the modernization and expansion program of existing ports and the development of new ports for a considerable time. Yet it appears that only comparatively recently has some systematic work been done to research port operations and investigate the factors that contribute towards better management systems in order to provide suitable bases for obtaining inputs to support the Bank's lending operations. It seems that the ports research "program" topics have been selected in terms of the particular specialization of the Bank staff involved (as for example in the case of development of the Port Simulation Model), and the time available to supervise projects. However, it is understood that competing priorities exist and financial constraints dictate how much can be allocated to research on ports.

25. So far, two major topics have been researched. These are:

(i) development of simulation model for port operations (PORTSIM).

(ii) port pricing and investment policies for developing countries.

As "research", the two seem to be at opposite ends of a scale: the Port Simulation Model makes use of existing literature and a well-developed methodology and provides a practical tool to assist Bank staff, borrowers and consultants in the assessment of port projects. The new Port Pricing work by contrast is a primary exposition of theory which has yet to be applied to any port operating system. Its usefulness as a formal tool for the planning and evaluation of port investments remains to be determined.

The Port Simulation Model

26. A computer simulation model using the classical operations research subject of queuing theory to analyze port operations is a transport research topic in which much work varying from graduate students' term papers to masters' degree theses has been done. Prior to the availability of the Bank's PORTSIM Model, many models could be obtained from universities and other institutions, as well as some international agencies. What is important, however, is that the features of PORTSIM emerged from the Bank's own operational needs. Unlike previous applications of queuing theory and simulation to port projects, the concepts and terminology used in PORTSIM are known to port specialists.

27. It is to be noted that PORTSIM is freely offered for use by member country institutions. So far, PORTSIM has been used by some UN Agencies and some port authorities in the so-called "middle-income" level countries. But in the majority of developing countries, even with the relative decreases in computer hardware prices, it must be queried whether the ports have the competent staff and adequate resources available to carry out the simulations. UNCTAD has chosen, with World Bank assistance, to develop a Port Planning Hanbdook from PORTSIM in which simulations for changing port parameters are presented in abacus form. This obviates the need for computer facilities but due to the simplifying assumptions made in the Handbook, it may not be applicable to all cases.

28. What has also to be considered is the question of the impact of PORTSIM on the Bank's analysis of port operations. Has the availability of PORTSIM speeded up project appraisals? Has it enabled the Bank to advise borrowing countries on the "correct" scale of port improvements needed to increase their cargo handling capacities? Or, when PORTSIM was previously unavailable, did the Bank's port projects result in substantial over/under capacity? The answer seems to be that sufficient other methods of analysis are available to consider the significant factors contributing to port project preparation and appraisals. What PORTSIM has allowed is a more accurate quantification of project benefits in difficult cases and a higher level of project analysis than previously attainable. To a small degree, therefore, PORTSIM has accelerated and improved the project preparation and appraisal processes and, on balance, development of PORTSIM has been clearly worthwhile.

Port Pricing

29. The second research topic, on port pricing and investment policies for developing countries, has generated some considerable excitement within the Bank. The project originated from a proposal to research the economics of containerization and its implications for port investments. This is significant in that it indicates the direction in which the Bank's research into port operations may be leading. There has been growing realization within the Bank that in evaluating the distribution of benefits due to port improvements, the effect on port revenues appeared to be small. It was difficult to identify clearly whether the major beneficiaries were the countries' importers, exporters, or the shipping lines using the port. It is hoped that the port pricing study will assist the Bank to develop standards for simplified tariff structures and improve its ability to measure the impacts of port investments.

30. The initial work setting out basic principles underlying the use of marginal cost pricing for port operations has been extremely stimulating and breaks new theoretical ground. Nevertheless, a great deal of further development is necessary before practical applications can be obtained. In ports of developing countries no data are available or immediately usable from which the marginal costs may be derived. The Bank has noted this problem and recommended a special effort to identify more precisely the gaps in existing

port accounting systems, many of which have been subject to Bank-proposed consultant review. A first tentative effort at application of the proposed approach to pricing was done in Karachi. These efforts should be supported so that eventually a manual based on actual data can be produced for easy reference.

31. There is still a long way to go, however, before any practical implementation can be conceived. Most, if not all, ports in developing countries are public bodies, under the control of a single entity within a government ministry. Their accounting systems tend to be the result of historical developments and they are usually geared to the government machinery rather than to management goals. It may therefore be necessary for there to be a transition period during which port authorities would maintain parallel sets of books.

32. One important result of the marginal cost pricing study is the recommendation for periodic adjustments to port tariffs, depending upon the levels of congestion experienced at the ports. Such congestion levels may fluctuate seasonally within a short period of one year or may keep on increasing with time. The recommendation for frequent adjustments in tariff levels will be difficult to accept by both the port's administration and port users alike. It has only been recently with rising inflation, that ports have adjusted their tariffs as "quickly" as once in 2-3 years. Previously, tariffs were left alone for many years without change. Even with biennial or triennial adjustments, port users voiced protests and raised spectres of increasing costs. The next step in carrying the port pricing study forward is to convince the ports of increases in efficiency, or other advantages to be gained, by more frequent revision of tariffs as may be necessary in response to congestion.

33. A final point to be noted is that, while the study originally included the theme of investment policy for developing countries, no detailed treatment or discussion of this subject was actually advanced. The study is confined to an exposition of the principles of marginal cost pricing, a compilation of some existing port tariffs, and some arguments on how these tariffs fit the theory of marginal cost pricing. There is need to expand the present study to research appropriate strategies for ports to maximize the net present value of their incomes by coupling pricing policy with the timing of decisions to expand port capacity.

Application of Ports Research

34. It has been generally stated that the Bank's research program is intended to support all aspects of Bank operations, including the assessment of development progress in member countries. It should also assist in developing indigenous research capacity in member countries. However, it would appear that the research results in PORTSIM and port pricing and investment policies for developing countries have been of major use to the Bank's staff only, although there is an implication that the research outputs are to

be accessible to developing countries as well. In order to ensure effective dissemination of the research results to policy makers in ports of developing countries, more attention has to be paid to developing the management and technical skills of ports personnel. Bank lending to ports does now include appropriations for labor, maintenance, tradesmen and middle management training. But these appropriations and efforts need to be increased if investments in port facilities are to result in improved systems of management and operations.

35. Management of ports has become increasingly system-oriented and port managers must, of necessity, have undergone some formalized training in multidisciplinary subjects. Development of information systems and data bases for short and long term planning are lacking. In fact, the need for such formalized training has only recently been realized within the developed countries themselves. For developing countries, the training of young port management personnel to be conversant in such topics and disciplines and to expose them to appropriate experiences within as short a time span as possible is to ask the ports to make a quantum leap. Yet the urgency and necessity to do so is unquestionable. If developing countries are to catch up and improve the efficiency and management of their ports, and if they are to make effective use of the Bank's research results, the assistance and commitment of the World Bank and other UN agencies are required not only for the provision of basic port facilities, but also for training programs, seminars and institution building in the developing countries.

D. Railways

36. In the Transportation Department's own view, the work done so far on the Railways is not very considerable. Excepting the Railway Costing Study, none of the completed items is a Research Committee approved project.

Costing Study and the Review of the Action Plans

37. The Costing Study (Report No. 472) must be rated very high. The quality of its professional work and the presentation are excellent. The work addressed an important need, and the report very satisfactorily realizes the objectives for which the work was undertaken. Knowledge of this study is well spread within the Bank and in fact the report is already in wide use. In more than one region, Bank staff have played a valuable (essential) part in disseminating its findings and in getting it used by the railway administrations. In fact great advantage lies in the Bank's regional staff (with the help of the costing study) assisting a country to set up its own costing system. This should be undertaken in at least one French speaking country and the result of this experience of adaptation reviewed for its lessons, since opinion has been expressed that the study needs to be adapted if not redone to make it more suitable and acceptable to former French administered countries.

38. The second work (the Action Plan Review) is a report by consultant specialists (M.N. Bery, former Chairman, Railway Board, India and W.H. Thompson, Director, Operations Planning, Norfolk and Western Railway, U.S.A.). This report focusses on one of the most fundamental aspects of Bank group lending -- to try by institutional, organizational and other means to step up and optimize operating efficiency, so that the borrower may in fact achieve the developmental, economic and financial objectives of the investments. The authors in this study (especially in the detailed country case studies) have gone to the roots of the problems encountered and have set out their recommendations as to the direction of future effort with perception and understanding. This is a document which can be of very real use to Bank staff dealing with railway projects.

39. Both these successful studies were made by railway experts with a wealth of experience, working in close collaboration with the Bank's own staff. Further, the consultant who made the first study was himself a former Bank staff member. While not everyone would classify these studies as research, they have been carried out in the correct way by the correct agency. Since propagation is required mainly among the Bank's own transport staff and the railway administrations of member countries, there has been no serious problem in their diffusion. They have been generally well received by the Bank's regional staff.

40. The Financial Analysis System (FAST): FAST was developed with the particular object in mind of facilitating rapid financial analysis of transport entities (Railways, Ports, Airports, etc.). FAST has been developed within the Bank itself with the help of an outside consultant, and has been well received by the Bank's regional staff. It is reported to have been used in several projects and monthly accesses within the Bank reportedly exceed 200. It can be used for sensitivity and risk analysis. It is particularly useful in minimizing the time and effort required (in the railway/port administration or in the Bank) for the inevitable reworking of financial statements through the many stages of evaluation of a project.

41. Railway Subsidies in Europe: Three outside studies have been commissioned by the Bank on the experience with railway subsidies covering Britain, Germany, Sweden, Netherlands and France, since such countries are often cited by potential borrowers concerned about their own railway pricing policies. These studies were rightly entrusted to outside consultants and will be read widely with interest. They have been completed only recently and the work of propagation/diffusion has yet to be done. These studies would evoke universal interest (particularly with respect to the steady shift of freight traffic in these countries from rail to roads). They are instructive in that the governments concerned appear to have formulated/operated their policy of subsidies not on any proven/stated economic case for a continuing and sustained subsidy of the Railways or of particular railway operations but on very general (including unstated) grounds. The studies also reveal that estimates of the investments required for modernization and of the likely amount of subsidies needed often proved to be gross underestimates.

There are thus indications more of dangers to be anticipated than of courses to be followed. But these general aspects apart, the applicability of the studies in these particular industrialized countries to the rather different conditions of developing countries (with their own wage levels and very widely differing geographical sizes and economies) may be somewhat limited.

42. Economic Role of the Railways - (On-going Study, Research Committee approved): A study with this descriptive title would by general acceptance be one of high value. In fact, it appears to be the major research undertaking of the Transportation Department on railways.

43. The relevant Bank document explains that the study on the Economic Role of the Railways is intended (inter alia) to develop better methods of forecasting railroad traffic demands and analyzing the role of the railways in national transport. The study is to be done in two phases. Phase I consists of a review of relevant literature and ongoing studies, and an analysis of data availability. The draft report on Phase I of the study is now available. It contains most interesting data on the trends in intermodal traffic sharing especially between road and rail. Conclusions from Phase I will form the basis of subsequent research, aimed at examining the determinants of rail traffic patterns and testing hypotheses. The draft study so far available is still in a preliminary stage and no new light has been shed as yet on what precisely determines the size of rail traffic (because work on this part of the study is still in process). Some questions to which the further phases of the study may provide answers are: What is the governing factor in the pace of the continuing rail to road diversion? What is its price elasticity and what are the critical service features which decide whether or not there will be further diversion? (What part is played, in other words, by the convenience of door to door transport, the reliability (or otherwise) of the promised transit time and/or the saving of time despite higher cost -- where road costs are higher). In countries where road user charges appear substantially less than what they should be, would the levy of correct road user charges have made a significant difference or will it make a significant difference in the future? What part will the newer techniques of containerization and roll-on/roll-off play?

44. In this study there is need to focus not only on the railways' share over time of particular types of traffic that have traditionally been and have continued with the railways but also on absolute magnitudes and the extent of retention over the years of existing traffic. It would be rewarding to look more closely at the trends subsequent to 1973 when the great increase in oil prices took place.

45. The detailed scope of the study has been well set out in the research proposal which covers much of what is stated above. An important topic which should also be treated in the study is the energy aspect. Data are available already on the energy use of rail transport (say per million tonne-kilometers of freight, or per million passenger-kilometers) as compared

with that of public/private carriers of freight and passengers, the bus, the private automobile, etc., in different countries. To state the matter rather simply and to give an indication of the orders of magnitude involved, the ratio in the case of freight varies from one to four (say in the U.S.A.) up to even one to five (in a country such as India which does not use the heaviest trucks and does not have the road system for them). What importance should be attached to this and to environmental aspects in examining the Economic Role of the Railways? Can one accept the view expressed by some that the ratio of the relative cost of energy from oil as compared with that in the form of electricity is likely to increase by fifty percent or more within the next ten years? What, if any, is the weight to be attached to any conclusion from this?

46. The above research is rightly being undertaken in the Bank itself but if the need is felt there should be no hesitation in employing consultants, under the supervision of Bank staff, for special studies on specific aspects.

47. The question of the diffusion/dissemination of the results of this research is still in the future.

48. The Railway Model (RAIL): Presently the Transportation Department is developing a general Rail Model which is intended to be a flexible, user-oriented model capable of analysis at different levels of aggregation (depending upon data availability and needs). The purpose is to have a model which can be used in project evaluation by the Bank, recognizing the relation of investments to specific railway services, the operational impact of changes in facilities and equipment (a consideration of alternatives could be made), changes in rail cost structure as a result of the project, etc.; sensitivity analyses could also be performed. This effort should be continued and the model tested and made operational. After such development, the feasibility of making it available to borrowers may also be considered.

E. Rural Roads: Socio-Economic Impact Studies

49. This line of research appears to have been conceived as a long range program of its own, although research efforts and expenditures todate have been on a modest scale compared to the Highway Design and Labor Substitution Studies. It addresses fundamental, if sometimes hidden, concerns of a number of borrowing countries. Overall, this research effort is one of the all too rare attempts at an in-depth evaluation of actions taken to improve the transport system: it presents a definite progress towards a more general implementation of Control Systems in this field.

50. Starting from an almost pure economics approach (based on cost-benefit analysis), the research has progressively taken a more socio-economic orientation, allowing for a number of qualitative (or non-money-expressed) factors to be taken into account which may make a project more effective, if not more "profitable". The first step was to get away from a narrow

"transportation view" of road benefits (Road User Surplus) and to take into consideration the surplus generated by the agricultural producers (including on-farm consumption), thus introducing an indirect economic effect that normally would not be attained without some associated agricultural development program. Next, such non-quantifiable impacts as improvements in the fields of Education and Health Services, or the better integration of a given region into the national community began to take into account. This evolution of the research approach is a very positive one.

51. In addition, this research is clearly of the "integrative" type. This means that, in the mind of the researchers, transport problems and actions cannot be separated from the development of the economic and social activities that are to be served by the movements of goods, people and information. This, as well as the attention paid by the research to institutional problems (land tenure, local government structures, etc.), closely corresponds to reality.

52. Another very valuable feature of this research is the quantity and quality of the socio-economic data collected, treated and presented for each case study. These have been obtained mainly through direct field work, including a large number of interviews. The data collection program and computing programs seem to be valid, consistent, seriously managed and of satisfactory scientific standard: this in spite of non-optimal work conditions. The fields covered by the data collection process are quite extensive and sometimes impressive. They include almost every information that could be relevant in order to trace out road impacts. A systems analysis type of approach is used in a very appropriate way that could be further pursued. It is to be appreciated that field work has been conducted in close connection with local authorities and research units and often used local personnel, thus trying to ensure a real inside view of the interviewed population's behavior.

53. Only in one case -- Madagascar -- has it been possible to conduct a before/after analysis (with all the consistency problems between the two data sets). This is the only way to provide a reliable basis for a dynamic analysis. It would be highly desirable that resources be allocated to carry out the "after" surveys also in Yemen and Ethiopia, and in other cases, in order to conduct a continuous evaluation over a period of at least 5 to 7 years.

54. It is worth mentioning that along with the case studies a particular effort of synthesis and formalization has been made in order to ensure dissemination of some of the results of the research to-date. This takes the form of the Rural Road Model (RRPACK) User's Manual and of a catalogue on "appropriate vehicles". Both are typical methodological tools that can help borrowing countries (as well as Bank personnel) when preparing and evaluating their projects, especially if they continue to be adapted to the needs of the users.

55. The research under review repeatedly stresses the potential use of the methods of economic anthropology, i.e., it indicates that cultural, historical and behavioral factors should be integrated in the project analysis and that anthropology could contribute to a better and deeper understanding of the meaning and importance of these factors, especially in traditional societies. Applying these methods, more insight could be gained in the field of mobility practices of different populations. They also provide useful warning signals against any tendency to use exclusively ways of thinking and reasoning which are largely based on value systems of the developed countries. This avenue should be further explored, possibly in connection with the U.N. Data on Primitive Societies.

56. In spite of its fundamental qualities of relevance and effectiveness, there are potential biases in this type of research. Most of them are pointed out in the reports and are rather unavoidable in the environments in which the studies were carried out:

(a) There is still a tendency to relate a number of expected and/or observed socio-economic changes to the impact of the road project as such. In spite of the typology attempted in the User's Manual introductory chapter, it seems doubtful whether it is possible to isolate from each other the effects of the road and the effects of other "activities" (in that case, an agriculture development program);

(b) Possible negative effects of the road, in terms of distribution of benefits between groups or between regions or more broadly, are not clearly taken into account (e.g., pack animal operators going out of business);

(c) An explicit consideration of the necessary time-lags before desired effects to begin to emerge seems missing: one would wish to see some work on this subject, which will become important in the follow-up phases;

(d) Although great attention is paid to qualitative factors, an important part of the research is devoted to the computation of money-expressed effects mainly related to the extension of the monetary exchange economy. However, an unusual amount of work has been devoted to analyze (and translate into money equivalents) the implications of the subsistence economy. Still more emphasis might be put on methods permitting the evaluation of qualitative effects by means of a ranking or ordinal approach 1/.

1/ On this subject see R. Comte and M. Quercy: "L'evaluation des Actions Transport en region parisienne: methodes et procedures de decision" Centre de Recherche d'Economie des Transports, Aix-en-Provence 1977 (mimeographed).

(e) In certain instances, reliance on interview surveys might introduce bias and result in questionable validity of findings even if these are expressed in seemingly convincing numbers. Against this, it must be acknowledged that in many instances interview surveys are the only feasible means of establishing relevant information. All means of cross-controlling interview data by objective measures should be sought.

57. A recent Bank paper on social and behavioral aspects of rural road work is an interesting introductory summary of some of the ways in which economic anthropology or the social sciences can contribute in the formulation and preparation of rural road projects. But we are concerned that not enough collection of social data may be underway in connection with ongoing Bank projects: proposals were made by the Transportation Department for a project in Kenya, but this has not got underway due to difficulties within Kenya; some elements of the approach are being applied by the Brazilians in a major research of their own, but this seems to be a unique case. We also feel that the time-budget approach might prove helpful for analyzing many of the social factors.

APPENDIX III

III. Bibliography: Recent World Bank Transport Research Reports

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5.	Comparison of Land Laid and Machine Laid Road Surface	January 1975
6.	Haulage with Lift of Materials: Lifting Sand by Ropeway	February 1975
7.	Productivity Rates of Earthmoving Machines	May 1975

Substitution of Labor and Equipment - Technical Memoranda (continued)

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9.	Report of First Road Demonstration Project	August 1975
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12.	Haulage by Headbaskets, Shoulder Yokes and Other Manual Load Carrying Methods	October 1975
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APPENDIX IV

1. Terms of Reference

OFFICE MEMORANDUM

TO: Members of the Transport Research Review Commission DATE: July 13, 1978

FROM: J. Cauas, Chairman

SUBJECT: Future Work of the Commission

As per our conversation and the approved terms of reference (see below), the following are the main elements of the future work of the group:

1. Main Issues to be Considered

(i) Is the program responsive to member country needs and how could it be more so?

(ii) Does the program make best use of the World Bank's "comparative advantage", i.e., as compared with other ways and means of getting transport research for developing countries done and applied?

(iii) Is Bank operational work on transport (loans, loan conditions, sector reports and sector policy discussions) suffering from lack of research in some areas? Should the Bank be responding more to its borrowers' needs by either different ways of treating present types of projects or new types of operations - perhaps based on research first?

(iv) Is enough being made of research possibilities in connection with transport projects financed - e.g., small built-in research or research based on results of built-in evaluation and monitoring?

(v) Is the Bank taking enough advantage of transport research done outside -- adequacy of links with outside institutions, responsibilities for bringing into Bank relevant results from outside research?

(vi) What is the right scale of effort for the Bank to make in transport research?

(vii) Has there been a correct balance between staff and outsiders in the Bank's research program and does the Bank have adequate staff to supervise new research projects? Has there been a correct balance of outside collaborators, e.g., from developed countries vs. developing countries, and between different regions of the world?

(viii) Is the Bank's transport research "operational" enough -- in subject matter and also in the way it is executed and disseminated? Or should it go beyond research suitable for disseminating through Bank operations (and hence helping to improve them)?

(ix) Are there any ways of getting a better dissemination of results -- mostly within the Bank since it is research for Bank operations (and sometimes difficult), but also sometimes direct to member countries, whence it can reflect back to Bank operations? Are Regional Offices doing an adequate job of dissemination?

(x) Should higher priority be given (in research and/or operational programs) to working with and assisting research institutions in developing countries, rather than treat that, as now, mainly as a by-product of efforts to reach answers on an important topic?

OFFICE MEMORANDUM

TO: Dr. Jorge Cauas, Chairman, Transport Research Review Panel

DATE: July 5, 1978

FROM: Christopher R. Willoughby, Director, TRP

SUBJECT: Terms of Reference

1. The review of the research program of the Bank is intended to assist the Bank management and Executive Directors in evaluating the effectiveness of past efforts and determining the size and nature of the program for the next five or six years. Transportation was one of the earliest areas of Bank involvement in research and it grew into a large scale activity over the years particularly as Bank resources came to be complemented by much larger efforts from various governments and agencies. However, during the past two years, major emphasis has shifted to the implementation of results from previous research rather than new research. Thus, the convening of the Transport Research Review Panel (TRRP) comes at a juncture when important decisions as to the future level and direction of transport research in the Bank have to be considered.

2. Below, I set out a series of questions on which we hope ultimately to have your advice; in Attachment 1, we have set out a suggested agenda for the meeting of the panel during the first week. The accompanying memorandum from Mr. Harral provides an overview of the transport research program since 1969 and a list 1/ of the most relevant publications and other documents for review by TRRP. As the total volume is rather substantial, it is suggested that Commission Members may wish to divide responsibilities as they see fit.

3. For a broader background and perspective on the role of research in the Bank in other sectors as well as transport, the functions of the Research Committee and the continuing evaluation of the basic objectives, effectiveness, and appropriate scale of the Bank's research effort, you are referred to the compendium of brief documents in Attachment 2 plus the 1978 Annual Report on Research, which is being provided separately.

A. Objectives

The review of the transport research program should focus on the period 1969 to 1978 as major research initiated in 1969 is still underway. In light of the overall objectives of the Bank's Research Program, the general questions to be addressed by the panel will concern:

- choice of research topics,
- the way in which the research has been conducted,
- operational relevance of the results,
- lessons for future research.

1/ Now Appendix III.

B. Guidelines for Evaluation

The general objectives of the Bank's overall Research Program (all sectors) have been defined as follows:

- to support all aspects of Bank operations, including the assessment of development progress in member countries,
- to broaden our understanding of the development process,
- to improve the Bank's capacity to give policy advice to its members,
- to assist in developing indigenous research capacity in member countries.

Given these general objectives, an approach to evaluation of the transport research program is illustrated below in the form of questions for discussion at review panel meetings. These questions, taken together, are an attempt to determine how effectively the research program has met its goals and how useful it has been in improving knowledge of development issues involving the Bank. While not intended as exhaustive, questions are grouped into headings which may be useful as a first draft of an organizing format for the report on the Commission's findings.

Choice of Topics

1. Are the general problems to which the research has been addressed of relevance for an international development institution?
2. Did the research address an important gap in the understanding of (i) the role of transportation in economic development, (ii) planning methodology or (iii) factual basis necessary for planning and evaluation of transportation investments?
3. Were the objectives of the research clearly formulated?
4. Was the research perceived to be of relevance by operating staff?
5. Did the research tasks follow a logical sequence?

Conduct of Research

1. Were the approaches and methodologies employed in the various studies appropriate to their stated purposes?
2. Has the research program been successful in terms of developing methodologies or providing factual information?
3. How effective were the consultants or consulting firms employed?
4. Was the extent of Bank staff involvement in design, implementation, and supervision adequate quantitatively and qualitatively to meet the study's objectives?

5. What was the nature and extent of awareness, support, or participation among:

   - Bank operating departments?
   - Researchers in developing countries (in government agencies or research institutes)?
   - Decision makers in developing countries?

6. How did the results of the studies correspond to what was originally expected? To what can be ascribed any differences between original and actual objectives?
7. Were efforts made to coordinate work with other studies underway in the Bank or outside, to enhance the comparability of results or avoid duplication?
8. Are the research outputs written and presented in a manner which makes them accessible to the intended audience(s)?
9. By what means have findings been communicated to the intended beneficiaries?
10. How do overall costs and efficiencies of the various studies compare with initial estimates? Did they take longer than expected? If so, why?
11. What appreciation, however broad, can be given of cost-effectiveness?

Operational Relevance of Results

1. To what extent has the research program yielded results that have been -- or are likely to be -- of value in fostering development?
2. Has the research program had any impact on policies of the Bank, of other development institutions, or of developing countries themselves?
3. Has the program assisted in developing research or other analytical capacity either in the countries under study or in general?

Lessons

1. What lessons for the conduct of future research projects can be drawn from the research program?
2. Should additional new research in transportation be undertaken and, if so, in what principal areas?
3. What measures should be taken to ensure effective dissemination of research results to policy makers in developing countries, to the research community and the Bank?

Dr. Jorge Cauas

cc: Mr. Dag Björnland
Mr. Rodolfo Felix Valdes
Mr. Goon Kok Loon
Mr. S. Jagannathan
Mr. Daniel L'Huillier
Mr. Hollis B. Chenery (VPD)
Mr. Warren C. Baum (CPSVP)
Mr. Bela Balassa (VPD)
Mr. C.R. Willoughby (TRP)
Mr. C.G. Harral (TRP)

International Bank for Reconstruction and Development

SecM78-493

FROM: Vice President and Secretary

June 6, 1978

REPORT OF THE RESEARCH ADVISORY PANEL
ON INCOME DISTRIBUTION AND EMPLOYMENT

Attached is the report of the Research Advisory Panel on Income Distribution and Employment that was appointed by the President in the Fall of 1977. It is the first of a planned series of assessments of the main fields of Bank research, which were described to the Board in the last annual review of the Research Program (R78-18[IDA/R78-11] dated January 30, 1978).

The recommendation of this Panel will be discussed by the Research Committee in the near future. Reactions to this and other panel reports will be reported to the Board in the next annual report on research.

Questions and comments may be addressed to Mr. Balassa, Acting Research Adviser (extension 61998).

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REPORT OF THE

RESEARCH ADVISORY PANEL

ON INCOME DISTRIBUTION

AND EMPLOYMENT

May 1, 1978

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Panel Members

Albert Fishlow (Chairman)

Professor of Economics and Director of the Concilium on International and Area Studies, Yale University

Simon Kuznets

Professor Emeritus of Economics, Harvard University

Sir Arthur Lewis

Professor of Economics, Princeton University and University of West Indies, Barbados

Justinian Rweyemamu

Personal Economic Advisor to President Nyerere, Tanzania on leave to the Independent Commission on International Development

Gerardo Sicat

Director - General of the National Economic Development Authority, Philippines

Leopoldo Solis

Sub-Director General, Bank of Mexico

Preface

The Panel was appointed by Mr. McNamara during the Fall of 1977 to review the research undertaken by the Bank on the subjects of income distribution and employment. Our terms of reference were broad and arrived at among ourselves. They included evaluation of the quality of research performed in these areas, future research priorities, and the effectiveness of Bank procedures relating to the research program.

Two meetings of the Panel were held in Washington, D. C. in October and December of 1977. Numerous interviews were held with Bank staff in the relevant research divisions, and more widely in the Bank. A wide sample of research was studied and reviewed. Two Panel members visited third countries which were the object of Bank study and international agencies to discuss how Bank research on these subjects was related to their own research efforts.

Throughout we have received full cooperation and have had complete access to research committee files. Numerous Bank staff in the DPS, CPS and regional departments have responded candidly and at length to our inquiries. We especially thank Montek Ahluwalia, Chief of the Income Distribution Division, Mark Leiserson, Chief of the Employment and Rural Development Division, and Ben King, who at the time was Research Advisor, for their help. We also thank Michael Beenstock of the Policy Planning Division who served as the Panel's liason with the Bank.

Policy Issues and List of Principal Recommendations

Policy Issues

The Bank program of research upon income distribution and employment has on the whole performed to high professional standards. Both the quality and quantity of its output are a tribute to the competence and technical proficiency of the staff and consultants. This is the more impressive in view of the modest resources committed to formal research.

There remain, however, larger policy issues and options to which it is useful to call attention. These fall into four categories:

i) Research Orientation - In general the research output in these areas has not seemed to relate as closely to the operational and policy requirements of the Bank as it might. To some extent this reflects a lack of practical interest in research and its implications on the part of the operational departments; to some degree, a failure to design projects that illuminate important policy issues, both from the standpoint of the Bank and of developing countries.

ii) Data - The Bank publishes and consumes a vast amount of data, yet it does not assume adequate responsibility for its consistency and reliability. This ambiguous attitude towards primary data has resulted in insufficient attention to the preparation of basic statistical series in both of the subjects reviewed.

iii) Developing Country Research - The objective of fostering research in the developing countries has been honored in the breach. Research efforts have gravitated to where the data have been most accessible and where indigenous research institutes have been most developed. Institution building cannot adequately be pursued as a by-product.

iv) Dissemination of Research - The dissemination of research output can be improved. More attention should be paid to communication with the operational and regional divisions of the Bank. At the same time, external dissemination might be improved both by opting for a new Staff Papers as well as more personal contact with developing country research institutes.

In some instances, recommendations represent major departures for the Bank, involving large additional resources, and implying possible organizational changes. This would certainly be the case were a serious effort made to collect and organize relevant data sets. Forging closer and more diversified ties with developing country research institutions is another potentially significant and new commitment. Even a fuller program of dissemination of research results, particularly extended to developing countries, can require large new inputs of time and money.

By contrast, the efforts required to reorient the focus of the research program and to facilitate articulation between researchers and other

staff are more subtle and not cost-related. Essential is a definition of research priorities that is conscious at all stages of the policy relevance of the results, with less attention to pure methodological research and an academic audience. We include in the following list of specific recommendations some suggestions for such a focus, as well as particular means of improving the dissemination of results and the administration of the research program.

List of Principal Recommendations

Substantive Research Priorities

Data

i) We recommend a considerably greater initiative and expenditure by the Bank to assure collection and dissemination of reliable, consistent and continuous data on income distribution and employment. For a number of representative countries, time series data should be obtained. Information should be sought for relevant socio-economic groups. Data collection and analysis, particularly in the preliminary phases, should be closely related.

ii) We see considerable merit in a decisive Bank contribution to the design and execution of the 1980 Census for a representative panel of countries. The objective of this exercise would be to establish benchmark measures for the distribution of income and the pattern of wage rates and earnings.

Income Distribution

iii) We recommend a change in focus from the size distribution of income *per se* to the levels and changes of the income status of a relevant set of socioeconomic groups. Of special importance is closer attention to the changing composition of socioeconomic groups over time.

iv) We detect a need for issue-oriented research to examine the direct and indirect consequences of particular policy interventions on various absolute and relative distributional indicators.

v) Income may not be a sufficient condition for the fulfillment of basic human needs or an adequate measure of welfare. We therefore endorse research upon a basic needs approach, especially in the areas of measurement, linkages among the components, and characteristics of delivery systems. However, it is important that this research upon basic needs be closely integrated with that upon the income distribution as a whole.

vi) We suggest that research upon specific policy instruments should be complemented by a series of comparative case studies organized around representative country units.

Employment

vii) We endorse an emphasis upon analysis of the functioning of labor markets, and the relationship between wage rates, earnings and employment in different institutional settings and for different sectors.

viii) We recommend a more careful and consistent measurement of employment and underemployment, and a systematic study of those who are and may remain in these groups.

ix) We judge that the Bank has a comparative advantage in project-oriented research that has not been satisfactorily exploited. A concerted effort should be made to assess the direct and indirect employment impact of its own many projects.

Research Dissemination

x) We recommend the preparation of a new series of reports aimed at the non-technical reader in the Bank. In the same spirit we see a need for an expanded seminar program at the beginning and conclusion of the research cycle for the regional departments and the operating divisions.

xi) We recommend regular missions to developing countries that have been studied, and others, to present research findings.

xii) We suggest publication of a new Bank Staff Papers to enhance the dissemination of the Bank's research output and to motivate research more relevant to Bank and developing country policy.

Research Administration

xiii) We recommend wider latitude for Bank research management in initiating projects and financing the first phases of projects.

xiv) We conclude that the present system of project-by-project evaluation is too mechanical and leads to bland evaluations. We suggest a more subject-oriented and recurrent review of completed and ongoing research.

REPORT OF THE RESEARCH ADVISORY PANEL ON INCOME DISTRIBUTION AND EMPLOYMENT

Introduction

The written work of the Bank in the fields of income distribution and employment is extensive. In the last several years, as Bank operational objectives have become redefined, more staff activities have been directed to these problems. Country reports, policy papers, and project evaluations all contain elements of research relating to income distribution and employment. These questions are of course interrelated. Sheer focus on employment misses the need to translate individual earnings into receipts of family units. It also misses the contributions to family welfare of access to goods and services that satisfy basic needs like potable water, adequate sanitation, satisfactory nutrition, minimal educational levels, etc. Examination of income shares or the absolute incomes of the poor, without a parallel emphasis upon the changing structure of employment opportunities, likewise affords only a partial view.

Taken together, these subjects provide a broader and necessary perspective of the development process that goes beyond aggregate averages like income per capita or measures of production capabilities alone. How the income distribution and absolute incomes of the poor alter with economic growth of different kinds, and how successfully economies create employment opportunities - and the possible tensions between such objectives - are central issues relevant for Bank and developing country policy alike.

In interpreting its mandate, the Panel has necessarily concentrated upon issues of internal, rather than international inequality. This reflects the emphasis of Bank research. We are pleased to see, however, that the Bank is beginning to pay more attention to the obvious international disparities and to the factors responsible for them. In practice this has meant that the panel has paid special attention to the activities of the Income Distribution Division of the Development Research Center and the Employment and Rural Development Division of the Development Economics Department. In the case of employment research, where the effort has been more diffuse, we have, however, considered some of the output of other divisions. Time did not permit us to cast a wider net. The research performed within these units is quite voluminous itself and covers a diversity of topics that are representative of Bank priorities. Such a scope was sufficient to expose us to a range of broader issues centering on the relationship of the formal research program to other Bank activities.

One part of our task has consisted of critical evaluation of the research product accumulated over the last few years. Three specialized appendices provide detailed and specific reactions. Here, it may be simply said in summary that our general impression of the quality of work is quite favorable. In an activity in which risk is high and disappointments are always to be encountered, the Bank output - compared to other research organizations and academic institutions - on the whole meets rigorous professional standards. This is the more so in view of the modest resources allocated to formal research. Our principal caveats are the failures to afford

sufficient priority to the collection and processing of basic data on a consistent and continuous basis, and to relate the research more closely to the operational and policy requirements of the Bank.

These evaluations of past research have also served as a basis for suggestions and recommendations regarding future research priorities and procedures. We offer these fully aware of our partial viewpoint and limited knowledge of Bank practices. We believe they may nonetheless serve to stimulate and focus discussion of these subjects within the Bank. The research program is an important component of Bank activities, and can make significant contributions to its operations. As we have noted above, this is especially true of research on income distribution and employment. The Bank's lending operations require systematic knowledge of how particular kinds of projects can generate productive employment, alleviate poverty and lessen inequality if a general concern for the welfare of the poor is to be translated into practice. The Bank's consultations with foreign governments require a comprehension of the underlying economic processes at work and their responsiveness to different kinds of policies. The Bank's leadership role within the development community provides an opportunity to speak on these issues both with authority and influence; it also imposes the obligation to understand the complex income distribution and employment problems in depth.

The body of this report is organized around a series of recommendations for future research priorities and for procedural changes to facilitate them. There are seven parts. The first considers the appropriate objectives and emphasis for Bank research on income distribution and employment. Although our suggestions derive from our perusal of the research performed on these subjects they frequently have relevance for the program as a whole. Next, three sections illustrate concretely how such a reorientation of research objectives helps to define a promising agenda for the collection and analysis of data, and for the study of income distribution and employment. Based upon our review of research in these subjects, three final sections relate our recommendations for changes in the research process to improve the articulation of the research program with other parts of the Bank, to make more effective the dissemination of results, and to make more efficient the selection and evaluation of research projects. These views must await corroboration, and perhaps modification, from reviews of Bank research conducted upon other subjects. It has seemed useful to offer them based upon our study of the research process relating to income distribution and employment.

I. Research Objectives

Research within the Bank as a formal activity is of relatively recent vintage and still modest proportions. External spending for the last few years has been at an almost constant $2.5 million (in constant FY77 dollars), and has declined as a percentage of total current expenditure. Allocating staff time committed to research projects and adding other outlays increases the absolute level to only about 4 percent of expenditure,

and does not alter the trend. Income distribution and employment have together commanded about a fourth of that budget between FY1974 and FY1976. In the last fiscal year, as the initial research program has been progressively completed, its share fell to less than 10 percent.

The objectives of the Bank research program, from its beginning have been ambitious. As identified at its initiation, and reiterated subsequently, the goals have been far ranging:

(1) To support all aspects of Bank operations, including the assessment of development programs in member countries;

(2) To broaden understanding of the development process;

(3) To improve the Bank's capacity to give policy advice to its members;

(4) To assist in developing indigenous research capacity in member countries.

The intended audience for research results has been correspondingly diverse: the policy and operating staff of the Bank; policy makers in developing countries; and the international research community.

The choice of such a broad perspective for Bank research has been conscious. "It has sometimes been suggested that we should concentrate more on the Bank staff as the major concerns of our research output. However, since research that is valuable for internal use in the Bank will almost by definition be of value to others concerned with development problems, we have concluded that most research projects must be addressed to all three groups". *

This approach has been characterized by extensive use of outside consultants in the research program and a willingness to undertake longer-term, more basic analyses of the development process. It has meant accumulation of a highly qualified technical staff. It has lead to an increasing volume of publication in externally refereed professional journals. It has, moreover, successfully established an academic integrity for the Bank's research program, an accomplishment of some proportions: Bank research does not hew to a single line or insist upon a single point of view.

But such a broad mandate has also produced an independence from operational concerns that is worrying. Table 1 provides a classification of research projects in the fields of income distribution and employment by their inspiration. Category I encompasses projects which have been instigated outside the DPS. This research can be said to service a felt need emanating elsewhere in the Bank. Category II contains projects originating in the DPS,

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* World Bank Research Program, December 30, 1975, p. 2.

Table 1

Origination of DPS Research*

Category I -- Service Projects

a) Income Distribution

b) Employment

671-61.

Category II -- Collaborative Projects

a) Income Distribution 670-94, 671-27, 671-36, 671-17, 671-62

b) Employment

670-43a, 671-30a, 671-48a, 671-26, 671-59a.

Category III -- Independent Projects

a) Income Distribution 670-06, 670-09, 670-69, 670-83, 670-84, 670-85, 670-96, 671-08, 671-41, 671-39

b) Employment

670-45a, 671-06, 671-31a, 670-90a, 670-99, 671-02, 670-42, 670-40.

* Research Project titles are provided in the Annex.

a Project of the Employment and Rural Development Division

but characterized by significant discussion and collaboration with regional and relevant operating departments of the Bank. Category III includes research initiated and pursued by the DPS more independently.

It is clear from the Table that the majority of projects - and even more so the expenditure - fall in Category III. A marginally larger proportion - but still a minority - of the employment studies are in Categories I and II than was true for income distribution. One might have anticipated a greater difference in view of the operational responsibilities of the divisions engaged in employment research, and the Income Distribution Division's more comprehensive research design that it early on justified and progressively implemented.

Autonomy in the initial design and execution of Bank research makes more difficult its subsequent articulation with other parts of the Bank. That is a problem to which we revert subsequently, and one to which the researchers are not the only contributors. Independence also tends to encourage original and theoretical research that may be more responsive to conceptual needs of the profession than to policy requirements of the Bank.

The comparative advantage - and for the most part, needs - of Bank research reside in the following:

(1) Establishment and analysis of a basic data base

The Bank needs to know, on a consistent basis, what has been, and is, happening with regard to underlying development processes in order to conduct its affairs. Its frequent missions, country offices, and position in the United Nations structure in turn afford significant opportunities.

(2) Project-related inquiry

Bank lending operations pose specific economic and social questions with regard to effectiveness of alternative design that call for focused and project-related research.

(3) Policy-related inquiry

Bank consultation with individual countries centers around policy packages of one or another kind. The Bank and country positions are influenced by what is known about the effectiveness of such policies in different contexts. Research outside the Bank may not serve as a satisfactory basis for such judgments, making it necessary for the Bank to conduct its own studies.

(4) Development strategy

The Bank's role in the development community - and its unique comparative, international perspective - requires

it to take a position on questions of larger magnitude: the workability of trickle-down vs. Basic Needs, for example.

It is our sense that the research program in income distribution and employment, while of high quality, has not focused narrowly enough upon these requirements and opportunities.

Such is the case with the creation of a data base. There seems to be a deep-seated ambiguity in the Bank attitude toward the importance of data. At one level there is strong commitment to empirical analyses as a means of discriminating among alternative interpretations and views. At another level, however, there is frequent acceptance of information from other, and sometimes non-primary, sources with only minimal attention to reliability, comparability and continuity. The Bank compiles, issues and consumes an impressive volume of statistics; at the same time, it avoids responsibility - intellectual and financial - for their accuracy and their completeness. The character of the research undertaken by the Bank to develop a better quantitative record relating to income distribution and employment is a good illustration of this ambiguity, as Appendix A documents.

In similar fashion, project-related inquiry regarding income distribution and employment impact has relatively little weight in the present scheme of formal research.* In part its modest role reflects an intentional division of labor within the Bank, reserving to the DPS more fundamental inquiry, and allocating to the CPS more operational studies. In part, its limited importance is also a requirement imposed by the level of resources available to the DPS; the research budget is a very modest one. Yet the potential significance of such research within the Bank context requires that more conscious priority be given to it by the professional research staff. Two aspects should be stressed. One is the design of research to exploit the quasi-experimental access to information operating projects afford. The other is direct assistance to operational staff in coping with project design. The DPS should be involved with both. Its research concerns should include prominently such questions as whether direct "cost per job" criteria adequately select projects intended to help the poor more generally.

Commitment of large, additional resources for research need not be involved in closer relationships between research and operational staff although some increment will surely be necessary. The DPS could offer to the operating departments on a regular basis an initial diagnosis and definition of the economic issues arising in the course of project design, and recommend outside consultants qualified to pursue them in direct collaboration with the operating divisions. Budget for such consulting is already available to the operating divisions; indeed, some portion might very well be internally allocated to the DPS to recompense their contribution. Recurrent economic problems of a more general character could in turn stimulate a genuine medium-term research effort within the Bank whose objective would be to devise

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* The exceptions are RPO's 671-17, 671-30 and 671-45.

approaches Bank staff might find useful in their preparation and evaluation of projects.

Policy related inquiry has an equal, and perhaps even more important, claim upon the research budget. Just as project-related advice and research provides a direct link to the operating departments, a policy related emphasis responds to felt regional and management needs. Policy in this context has a dual meaning and dual relevance: Bank policy and developing country policy. The apparent formal separation of the preparation of Bank policy papers from the research process in these two subjects has had the unintended effect of diminishing the incentive for design of research projects whose final contribution might be a policy paper. Similarly, developing country policy has been viewed as too narrow and descriptive an area to merit formal investigation. Rather, income distribution and employment research has come to be defined as long-term to the exclusion of more focused and medium term efforts. Adaptation and application of existing conceptual research has not been encouraged; the researcher's own biases in favor of more basic analysis, particularly if there is interest in a subsequent non-Bank career, are thereby reinforced.

Yet such policy-related inquiry is of the essence for the Bank. It is needed to provide a firm basis for the Bank's hortatory influence upon domestic policy within developing countries. It is required to make decisions about which individual country lending programs should be supported to a greater or lesser degree. It is indispensable if the specific projects undertaken by the Bank are to be translated into a larger and coherent influence upon economic policy and resource allocation within particular countries.

A rich experiential basis for research upon policy interventions exists. Particularly in the areas of income distribution and employment, it is difficult to imagine policy instruments that one developing country or another has not already used, at one or another time. Such research also especially lends itself - as does a more serious data collection effort - to greater collaboration and institution building within the developing countries themselves. Advice that has its roots firmly grounded in local inquiry and analysis - particularly when it relates to sensitive issues like income distribution and employment - is more likely to be taken seriously. We return to this point at the end of this section.

The last Bank requirement, an understanding of the larger questions of development strategy is less a separate category or style of investigation than an integrating principle. Increasingly, the Bank is called upon to take positions about how development should be pursued, internationally and by its member countries. The Bank has spoken out forcefully to call attention to the widening inequality, persistence of absolute poverty and inadequate employment opportunities associated with sheer income growth. The Bank will undoubtedly be called upon to do so again, if only to give greater substance and structure to the evolving possible consensus in favor of development assistance oriented toward satisfying basic human needs.

These Bank positions should emanate from a cumulative and technically informed view of both underlying development processes and responsiveness to policy interventions. They therefore require a synthesis of Bank and outside research. It might well be useful to have the relevant research divisions prepare at regular intervals a user's rather than a producer's review of the literature on these larger issues. While the Bank has financed many good and useful reviews on the literature relating to employment and income distribution, these surveys have been largely directed to a professional audience. What we have in mind is a review process that goes beyond the conventional background papers written for policy documents and which draws implications for Bank policy and development strategy. Such reviews should anticipate management needs and help set an agenda for more specific policy papers. Such reviews in turn could help to define new Bank research projects to test the validity of the conclusions and to question the conventional wisdom.

This reorientation of substantive priorities should be accompanied by greater attention to the research capability and potential in the developing countries. It is fair to say that among the diverse and ambitious goals the research program on income distribution and employment has set for itself, an impetus to indigenous research capacity in developing countries has been most honored in the breach. This has not happened entirely for lack of trying. Two of the principal, data-oriented income distribution projects have been contracted to regional agencies, for example. Still the focus of research attention upon a few developing countries - Colombia, Korea, Malaysia among others - stands out. They are selected not on the basis of practical need or interest, but largely out of convenience in terms of indigenous research capacity and accessible data. Frequently, those same countries become the focus of research projects on other subjects. We are not advocating that each research topic should be spread over a wide range of countries; we are concerned, rather, that there be representativeness - consciously determined - in the program as a whole.

Institution-building is costly, both in human and financial resources, and cannot be achieved as a by-product of other goals, which is the present expectation. Consultancies will have a natural tendency to be concentrated in the industrial countries, and even in the United States, because the necessary supervision and desirable interaction with the Bank staff are easier to assure. Solicited and unsolicited suggestions for projects will come forth from a circle restricted by the asymmetry of information about Bank research interests and procedures. Particular country targets therefore must be identified as such; the specification of the research projects themselves may have to come subsequently. We appreciate this is a departure from the present practice that focuses on projects and not institutions. The specific research undertaken in chosen targets may well have to depend upon the indigenous research capacity and professional interests that can be mobilized.

No less than the research projects themselves, the means of developing indigenous capacity requires careful planning and continuous monitoring. Some efforts at collaboration have not worked out as well as had been hoped and anticipated. One of the reasons has been the inadequate

interaction from the Bank side; there are simply too many other competing demands on staff time. If an effort is to be made, it must be adequately financed and staffed.

Closer collaboration between the Bank and developing country research institutions admittedly presents additional complex problems of freedom of academic inquiry and publication. Governments and academic research institutions overlap to a considerable degree in developing countries. Inquiries involving income distribution and employment are sensitive and political matters - involving not merely different socio-economic groups, but frequently also racial and regional divisions. The Bank has an obligation to press for dissemination of research results as a condition for participation, just as it has an obligation to insist upon objective and professional standards of inquiry. Some countries may refuse to collaborate on such terms; others will be eager for assistance and recognize the advantage of research rather than advocacy.

Despite the significant additional costs, financial and supervisory, we believe the goal of supporting research in developing countries deserves greater attention and priority. The Bank's existing involvement with developing country research institutions should be diversified and extended. If one ultimate objective of the research program is to influence developing country policy makers, it is difficult to imagine its realization absent a more sustained set of initiatives to encourage research in the countries themselves. A more explicit policy focus to research - and one less emphatic on conceptual originality - can contribute. Those problems are more consistent with interests found in the developing countries.

Beyond the direct institution building benefits of greater research interaction, we detect and emphasize two others. In the first instance, research collaboration with developing countries is a reciprocal relationship. There are diverse ideologies of economic development being pursued today in a variety of countries. The implications of these different models for income distribution, poverty alleviation and employment creation are a source of continuing debate. The Bank requires broad intellectual contact with developing countries of diverse developmental styles beyond its relationship through missions and project teams. Such contact can and should influence the questions the research program seeks to answer.

The second indirect benefit involves a closer potential association of developing country researchers with regional Bank staff as well as formal research staff. A significant element of the relationship with developing country research institutions will have to be managed by those in the Bank who are responsible for following individual country performance. In the normal course of missions and other overseas travel, abundant opportunities for interaction are presented. Involving the Bank's regional staffs more deeply in the research efforts of the countries also means more concern and interest in the research underway in the Bank itself.

We thus see reinforcement of other objectives as a consequence of a sustained effort to fulfill the Bank's potential institutional contribution

to developing countries. It is a major departure that will have to be pursued diligently and in a phased fashion. Selectivity among countries will still be necessary, although more broad and based upon other criteria than the present small group enjoying close association with the Bank's research program on income distribution and employment.

The reorientation suggested here to some extent merely accelerates tendencies within the present research program. Taken together, and implemented coherently, the recommendations help to define more specific priorities. The next three sections spell out some consequences for new research initiatives involving collection and analysis of basic data, study of income distribution and examination of employment questions.

II. Data Collection, Processing and Analysis

We recommend a greater initiative and expenditure by the Bank to assure collection and dissemination of reliable, consistent and continuous information on income distribution and employment.

The Bank has played a prominent role in publicizing and using extant information on the size distribution of income in a large number of developing countries. It has also sponsored two large regional projects - one in Latin America, the other in Asia - to exploit survey data already available but not uniformly organized. As Appendix A details, these efforts fall short of what is desirable and necessary. The primary concern of such research has not been with the data themselves; nor have the projects been designed as a continuing effort to monitor changes over time as development proceeds.

We understand the reluctance of the Bank to accept prime responsibility for such a data effort. It represents a major departure from current practice and must be carefully weighed. The undertaking is expensive and difficult to execute. Yet we emphasize its importance if the Bank is to make well-informed and reasonably based judgments concerning the most fundamental income distribution and employment issues. At the present time, it is frequently difficult to say whether conditions have improved or deteriorated in a given country, let alone precisely how. Sporadic accumulation of instantaneous data in a number of countries is not a solution. Cross-section studies are not an adequate basis for formulating "development laws," or even more modest projections of the positive and negative forces operating on the income distribution in specific countries.

What holds for income distribution holds with equal force for employment statistics. The Bank currently relies extensively upon information obtained directly from member countries through missions, and upon statistics of the ILO. How such data compare with those of previous missions is often not a matter of concern. Neither is the quality of price deflators that frequently have a central importance in the determination of whether real wages have increased or declined. The dominant practice seems to be, when either the employment or income distribution issues are addressed, to use as much and as diverse information as possible and to hope for modal consistency.

Such a casual view - perhaps understandable in the immediate pressure of producing a country report or a policy paper - is inconsistent with longer term requirements. As an institution, the Bank can afford an investment whose social yield is extremely high but farther off in the future; no individual or academic institution can have that luxury. There is a large pay-off to the Bank in reducing the present duplicative and inaccurate procedures. Ideally, the statistical office of the United Nations or the ILO should undertake the required effort. That simply has not happened. The considerable intellectual requirements, particularly at the start of such an undertaking, and the usefulness of the information to the Bank call for greater Bank initiative and responsibility. Country statistical offices cannot be expected - even with technical assistance - to perform the required tasks alone.

We therefore see considerable merit in a decisive and immediate Bank contribution to the design and execution of the 1980 Census that all countries will be undertaking in the very near term. Bank participation need not be universal. The choice of a reasonable panel of countries, based not upon the ease of data collection but their representativeness, is a feasible means for establishing benchmark measures of the distribution of income.

The objectives of such a project should include the size distribution, not merely for individuals but also for households. There should also be attention to relevant socio-economic groupings - urban service workers, rural landless laborers, etc., cross-classified by other characteristics. To the extent that individual incomes at any point are influenced by a series of random effects that do not affect the long-term permanent streams of income, the size distribution may be a misleading indicator. This measure also fails to draw attention to the full implications of structural change and mobility as groups change in size and composition.

Such information on socio-economic groups provides a more direct link to the production process than data regarding the size distribution. This makes them easier to obtain accurately and on a continuing basis over time. It also facilitates the construction of economic models that more naturally relate to these groups than the individuals and households that underline the size distribution. We therefore encourage and endorse the on-going work at the Bank to estimate such social accounting systems. What is now required is a much larger and more systematic approach toward collection, organization, and testing of the data than has been characteristic in the past.

In parallel fashion the Bank must concern itself with developing reliable series on unemployment, wages, skill differentials, price deflators, etc., not for single years, but over time. The Bank cannot afford to wait for others to take the initiative. A policy decision is called for if the ILO is unable to meet the need.

Research at the Bank is largely conceived as hypothesis testing. Data have been collected for micro-studies when they have been found necessary; conversely research projects have been designed around data that have become

available. The thrust of our recommendations is to elevate systematic and aggregate data production to an equivalent status. Such conscious and continuing effort by the Bank would have a large pay-off for the quality and policy consequences of the research done upon income distribution and employment, both inside and outside the Bank.

III. Income Distribution Research Priorities

We have identified four priorities for future income distribution research. These include research upon the characteristics of socio-economic groups; study of the consequences of different policy interventions pursued by countries to alleviate poverty or improve the distribution of income; specific analysis of the effectiveness and implications of a basic needs approach to the problem of inequality; and comparative case studies of the relationship between national strategies of development and evolution of the distribution of income. These new directions are compatible with the evolving interests of the Income Distribution Division, and build upon its previous analyses.

Our first category exploits socio-economic groups as central actors in the production and distribution process. Empirical studies of the behavioral characteristics of these groups are a fruitful area for investigation. Some of these characteristics have been more studied than others - like consumption demands; others have been less explored - like the possibilities for substitution among different classes of workers in production; and still others have been largely ignored - mobility among groups and regions.

These characteristics, among others, are the essential building blocks for more complete and formal models of the distribution process. To some degree, as Appendix B comments, earlier Bank research has proceeded to formal models that are not firmly rooted in these behavioral relationships. There is still much to learn about the nature of the demand for labor by small sector industry, urban service activities, and peasant agriculture. Supply conditions of labor, including those of supplementary earners, have not been systematically examined. The appeal of modern industrial goods to low income consumers, and differentially in urban and rural areas, is likewise a topic for further study.

Such empirical investigations are required for a wider range of countries. The hypotheses have an interest in their own right; the research is not merely a means for determining the best parameter estimate for one or another model. We want to know how different groups are likely to respond to changes in income, prices, wages, etc., and therefore whether income change alone is sufficient to alter some of the worst characteristics of poverty.

Closer attention to the changing composition of these socio-economic groups over time is especially merited. Equal measures of inequality give rise to far different implications in societies of high and low mobility. Temporary circumstances of individual poverty can be compensated by transfers, private and governmental. Permanent, continuing conditions of deprivation for the same groups are another matter.

Socio-economic mobility is not an easy subject to study. Longitudinal data are not abundant in developing countries, particularly for the rural and informal sectors. What we have is limited to a few surveys. There is more that can be done in the formal urban sector, however. Most developing countries now have social security schemes and hence data on individuals over time. The importance of the mobility issue commends a major effort to define a research project on the subject.

A second thrust for future Bank research ought to be analysis of the impacts of particular policy interventions. What makes income distribution policies more difficult to implement than most is that the initial consequences get diluted by subsequent market interactions: a rise in minimum wages may limit employment opportunities for the unskilled, as well as contribute to price increases that cancel the gain in nominal wages; public services that are provided free or at nominal cost may be traded or underutilized. There is a need to pursue systematically these and other policies to trace their ultimate impact.

Such partial analysis frequently runs aground because the second-order effects should ideally be studied in a general equilibrium context. Yet there are also many cases where one can stop short of looking at the whole economy to understand what has happened. It is that difficult, but creative, intermediate research that we wish to encourage.

The policy interventions that could be studied are diverse. They range from governmental sectoral programs involving the selective provision of social services, food distribution programs, etc., to macro-economic policies like monetary stabilization packages, minimum wage legislation, and tariffs and subsidies encouraging more complete integration into world trade and capital markets. They also explicitly include the impact of individual Bank projects as well as Bank sectoral lending priorities. The consequences of developing country interventions as well as the experience with loans and credits are relevant to the continuing evolution of Bank policy. Bank recommendations for specific member country domestic policies, as well as its own selection and design of projects, should both be informed by such research.

One specific set of policies merits special and separate attention. Growing concern within the Bank, as well as among development assistance donors more generally, with a basic needs strategy commends the subject for careful analysis. It is a natural and appropriate outgrowth of the Bank's interest in absolute poverty and its indicators, and policies to alleviate its worst effects. In designing its own research, the Bank should take cognizance of the mushrooming volume of investigations underway in other international agencies like ILO, UNRISD, and UNESCO as well as in national donor agencies.

Three aspects would seem to have priority for the Bank. One is the analysis of linkages and complementaries among the various basic needs that have been advocated. This is an essential input into the efficient design of appropriate delivery systems to satisfy the needs. The second is the consistency between satisfying basic needs and continuing inequality in the

distribution of income. There is sometimes the suggestion that a basic needs approach can leave the production and distribution structure substantially unaffected, and avert significant income redistribution. Yet large changes in the composition of output may be implicit in a basic needs approach, with consequences for the returns to labor and capital, as well as the ownership of productive resources. Closer examination of the overall distributive implications and compatibilities of a basic needs approach is therefore very much required.

The third topic is an extension of the last. It is the integration of the basic needs approach within a broader framework. More careful attention must be paid to which basic needs the market can satisfy better than others and to what the potential trade-offs may be between provision of such needs and other applications of such resources that might enhance equalizing growth. Absolute and relative deprivation, as well as economic growth itself, must all be interrelated more explicitly.

These questions are all amenable to research. They are issues in which the Bank has considerable interest as well as comparative advantage. It is less obvious that topics like participatory planning or internal political issues involved should be accorded the same priority. The first duplicates what the ILO has been studying; the latter involves questions of the nature of the state and the interests it represents, complex subjects in which the Bank does not seem to have an evident expertise, and which are susceptible to potential controversy.

Our fourth category is a natural complement to the issue-focused analyses previously discussed. We see advantage in a series of comparative case studies organized around country units that can capture the cumulative impact of diverse development strategies. The countries should be carefully chosen for representativeness. Close collaboration with local researchers and research institutes should be established as part of such a project, as well as a start on collection of basic data.

The usefulness of such country studies for policy purposes should perhaps be underscored. The now changed perception of developing country opportunities to benefit from international trade has been much influenced by such comparative national studies; one pioneer effort has been undertaken by the Bank itself. That had the advantage of a simple measure, effective protection, around which the studies could be grouped. Similar organizing principles must inform a set of studies on development and distribution to avert mere catalogues of policy measures and unstructured speculation.

These four specific research priorities give substance to our earlier views relating to desirable objectives of the Bank research program. These are not projects as they stand; they obviously require more precise formulation. It is our sense that it will repay the effort to do so.

IV. Employment Research Priorities

Our priorities for research upon employment issues are, not surprisingly, closely related to those for income distribution. They may be

grouped under three categories: careful study of developing country labor markets; analysis of the characteristics of the unemployed; and research on direct and indirect employment creation resulting from different kinds of projects. These generally conform to the emphases of the Employment and Rural Development Division. Their effective implementation would seem to require a degree of coordination of research upon employment among the relevant research divisions that has been lacking in the past.

The need to know how labor markets work in developing countries is a pressing requirement. The institutional circumstances that condition market forces, the relationship of enterprise characteristics to labor demand, and the determinants of labor supply are all important parts of the story.

The principal concern is whether there is any tendency for wage rates to adjust to unemployment and to facilitate creation of new employment opportunities. How long the adjustment process takes, and whether it favors particular groups - skilled or unskilled, say - are central issues, especially when population growth assures continuing rapid expansion of the labor force.

Labor markets have been conventionally disaggregated into three components: the informal and formal sectors in urban areas, and a rural sector. There distinctions have facilitated the construction of analytic models, but may not exhaust the potential for study of their different adjustment processes.

There seems to be abundant opportunity for studies that examine the informal sector in detail to determine which activities expand with higher income, for example, as well as the sensitivity of employment opportunities to wages paid in these different activities. The characteristics of the internal labor market - the practices of recruitment, training and promotion within firms - likewise call out for study, particularly in the middle income countries. The role of trade unions, of hiring and firing regulations, and of the practices of public sector enterprises, are important and neglected subjects. They have considerable influence upon how efficiently and effectively labor markets can perform. Finally, there is the structure of employment within industry, and the pattern of interindustrial wage rates, that have not been examined with care.

We also call attention to the neglect of the growing importance of international labor migration - increasingly unskilled - as a phenomenon relevant to many developing countries. The implications for employment creation in these countries, the role of remittances, the permanence of settlement abroad, and the consequences for income distribution are questions that would repay careful research. Not least, such migration - like the movement of capital and goods - affords a mechanism by which the poor can share in the prosperity of the rich.

Our second category is a logical counterpart to the focus on how labor markets function to create employment opportunities. We note the need for more careful and consistent measurement of unemployment and underemployment as well as systematic study of those who belong to both groups. In many

countries it is almost a matter of sheer guess-work to assess the degree of unemployment and underemployment. Inconsistent definitions over time and among countries inhibit meaningful comparisons. The composition of these groups are not known with great precision. Nor is there much information about how they are financed when they are not working, or have limited earnings opportunities.

Policies to promote employment are, as a practical matter, policies to create jobs for many who are currently without work or underemployed. The effectiveness of such policies necessarily depends upon better knowledge about the persons for whom jobs are being created. Design of income transfer mechanisms to those without earnings require similar information. We are not advocating mere compilation of statistics. In most countries policies of both kinds to deal with unemployment and underemployment have been tried. It is important to find out what has been successful in reducing the pool of the jobless and partially employed and to analyse the reasons for failure as well as success.

A third line of research activity to be encouraged is more specifically project-oriented. High in priority are studies that trace through the direct and indirect employment effects of different types of projects. For example, does lending that establishes a low capital input per job utlimately mean a larger level of employment? Under what conditions will such a proposition hold, both in rural and urban settings? This type of inquiry can start from the data generated by particular projects themselves, but requires extension beyond direct and short-run impacts.

A second aspect of project-oriented research should be technology-focused. Some Bank work already has been undertaken in the design of civil construction techniques that are more suitable for labor abundant economies. The research derived from that experience has been largely descriptive and uninformed by more analytic considerations. More can be done. Much of the small-scale industry research now being planned can be tied to different kinds of projects actually implemented.

Project-oriented research has not always been highly regarded because it has seemed insufficiently conceptual, and rather too much a practical matter. That is a mistaken view, especially from the vantage point of the Bank. Understanding and interpreting practice is not a mere matter of description. An economics, as well as an engineering, perspective is required to be sure that relevant interactions are not missed. The experimental opportunities afforded by project-related research are matched by the need for conceptual talents if they are to be effectively exploited.

Research on employment issues by the Bank is complicated by the designation of the ILO as the primary U.N. institution in this area. This leads to overlaps of responsibility, particularly as regards collection and analysis of basic data, and imposes problems of coordination. The Employment Division also has had a far-ranging set of obligations that have made it difficult to focus its research efforts upon a series of key projects. The priorities we have suggested may help better to define the interface with the

ILO, better to concentrate the efforts of the small number of staff in the Division, and better to coordinate the research under way in other divisions.

V. Articulation

Research at the Bank has among its prime objectives an influence upon Bank operations. Indeed, many would regard it as the principal goal. For that very reason, the relationship of research to operations has not been an easy one within the Bank. Operational expectations of a proximate feedback are inevitably frustrated by the larger and longer perspective of the research effort, the intermediate rather than final character of much of the output, and the generic inability to meet close deadlines. The small size of the research staff relative to Bank operational capacity also means a limited in-house capacity to take on specific problems for solution, and thereby creates an impression of lack of responsiveness. Limited staff likewise reduces the capacity to perform research directly. The role of consultants is therefore large; in the early phases of the research on income distribution, it was unusually so. These consultants are not on the scene to explain and motivate their research; nor is it easy for them to mold it to conform better to the interests of others in the Bank. Their interactions are limited on the whole to a restricted research circle.

There has been a conscious decision, moreover, to protect formal research from the all consuming demands of immediate problems. The Income Distribution Division, for example, was sheltered from operations by its assignment to the DRC in order to facilitate its initiation of a research program. This has been tantamount to the creation of a small research center within a larger institute for development economics. One of the consequences has been a lively and congenial atmosphere - involving more personal interaction than seems typical of the Bank as a whole, and an independence that is an important element in creative scholarship.

Elsewhere in the Bank, however, such an arrangement is looked upon with a somewhat jaundiced eye. It is interpreted as freedom to pursue esoteric and irrelevant interests. This lack of shared values among different parts of the Bank reflects itself in the style and extent of intellectual interaction. Despite procedures designed to be supportive of contact, and indeed, a variety of requirements for consultation, there has not been much effective collaboration. Research projects have been primarily developed by the researchers. We have found expressions of disappointment among Bank nonresearch staff regarding the usefulness and relevance of the research, and on the whole, little enthusiasm: laissez-faire seems to be the modal view, preserving as it does the status quo.

Conversely, among researchers themselves engaged in the study of income distribution and employment, there is also dissatisfaction with inadequate attention to, and appreciation of, their efforts. Potential users in the rest of the Bank are not entirely innocent victims. As far as we can tell, it is not standard practice for those with regional and operating responsibilities to examine research reports with care, and still less to

return comments, even when the focus is one's country, or functional specialization. The typical reason offered is lack of time. It is not wholly acceptable or convincing; it is just another way of saying that such interaction has low priority. On the user side, such neglect is symptomatic of the larger pressure to get on with projects, or the required country reports, memoranda, etc. Relevant research in this sense is viewed not merely as nonproductive, but potentially counter-productive. If particular views must be re-thought and old patterns altered, the same pace of committing resources cannot be maintained. In some instances, it has even been suggested that irrelevance is therefore preferred to more applicable analysis.

That undoubtedly is a caricature. Still, from what we have seen in these two subject areas, the Bank reward and incentive system does not seem to encourage individual initiative and novelty. Indeed, in the case of one country office of apparently above average performance, it is standard practice not to retain any of the earlier research reports in the files. Each country economist is presumed to start from scratch, and unburdened by knowledge of on-going research relating to the country.

Nor has there been an impressive impact at the management level. Research reports do not seem to have been regularly and systematically fed into the DPS policy papers that form their basic agenda. Rather it seems to be more typical for other, and sometimes parallel, shorter term assignments to inform the management on such income distribution and employment questions like urban poverty, basic needs, etc. To be sure, the formal research staff has sometimes made significant contributions by initiating memoranda growing out of their own perceptions. But these interventions would be more effective if they were a regular outgrowth of the research process.

This lack of articulation between Bank research and operations is therefore not a simple problem. It can be somewhat ameliorated by creating larger and more varied working groups from different parts of the Bank to supervise research projects, and by improving dissemination. Resolution of the problem goes deeper. It goes to the heart of how operations proceed, how policy decisions are taken, how far the departments concerned are willing to cooperate, and how individuals are motivated to respond to changing ideas.

One can perhaps make a start by conceiving of policy papers as the culmination of the research process, rather than as its source. There will be obvious exceptions - as when the research is explicitly methodological and therefore intermediate. Sensitive management would be required to anticipate policy needs, and to avoid succumbing to the pressure to produce immediate policy papers without adequate scope for research that could enhance their value.

VI. Dissemination of Results

Communication of findings is a central part of the research process. As the research program has prospered in recent years, the Bank has broadened its audience. Publication of articles in professional journals by Bank staff has been encouraged; books regularly appear with Bank sponsorship; working

papers in their preliminary form are sent to a series of recipients (outside the United States), in developed and developing countries both. The increased external dissemination of Bank research results is both a significant accomplishment of the research program, as well as a measure of its high quality.

Despite this success, and indeed partly because of it, we recommend a new departure. That is the publication of a new Bank Staff Papers analogous to those of the Fund. We believe such an outlet would be a necessary and powerful incentive to guide research along more policy applied lines as we have earlier recommended. So long as Bank research staff must aim for academic journals as a primary outlet for their published efforts, their research will almost inevitably be academically slanted. Publication is essential for research staff to retain their professional identification and mobility. It is important to have a vehicle that remains of high caliber but whose principal focus is development practioners concerned at least as much with problems as with concepts.

We perceive a second advantage. Such Bank Staff Papers would be a medium that is not exclusive to formal research personnel alone. Other Bank staff could and should contribute as well. Such an opportunity will have a subtle but powerful influence upon integrating research and operational personnel. Originality in response to Bank needs will be given explicit reward and encouraged. More abstract research results adapted to particular applications will have an intellectually respected outlet. Differentiation between economists working elsewhere in the Bank and those specifically engaged in research would narrow.

The arguments against such an innovation seem to be two-fold. One is cost. This does not seem binding. The I.M.F. Staff papers, published three times a year, have a net cost of $100,000 annually, after full allowance for personnel allocated to editorial effort. That would represent only 5% of the present Bank external research budget, and less than 2% of total expenditures for research. This must be regarded a modest expense to reach on a regular basis some 3,000 subscribers, and many more readers through access in libraries.

The second argument is that such a Bank publication is premature at best. Some feel that the quality of Bank research, especially as broadly defined, cannot guarantee the regular flow of results required. Reliance on outside refereeing, as at present, assures automatic enforcement of standards; internal decisions, coupled with the pressure to produce continuing issues, might be more lax. Such an assessment cannot be taken lightly, particularly when professional journal publication has been subject to exponential proliferation. We do not concur, however. What is at stake is not quality, but too narrow a criterion of research and relevance. Something intermediate between Finance and Development and decentralized publication of individual research results could be an appropriate and powerful medium for encouraging a distinctive style and focus to the Bank research program. Admittedly this requires an editor and editorial board of good judgment.

The question can be more reasonably decided by seeing what sample issues of such Staff Papers might look like. The current annual flow of working papers, country reports, policy papers, etc., can be culled to prepare representative issues. These can then be evaluated for their quality. Such a test excludes the beneficial internal incentive effects that the new publication should have. The experiment seems well worth undertaking; there is already an Editorial Committee and a cumulative experience with monograph publication.

With or without a new journal, external dissemination of Bank working papers, some which will perhaps not be published at all, can be extended. At present, university centers in the United States are excluded. There seems to be no good reason. The number of institutions abroad receiving the series on a regular basis might also perhaps be increased; at the very least greater publicity should be directed to their availability. The intended effects on developing country research and research institutes do not seem to have occurred from the present distribution program; there does not seem to be much regular reference to parallel Bank research in the work done abroad.

An additional inadequacy of the present structure of communication with developing countries should also be pointed out. Our review of income distribution and employment research indicates infrequent post-research contact with the countries that have been studied. As a rule, research results relating to a specific country, or some group of them, ought to be presented there. Even without the greater direct collaboration advocated earlier, seminars in developing countries can contribute to institution building and can influence research priorities and methods. Country reports presently are the occasion for careful consultation with governments; parallel considerations apply to research. The Bank research effort is, and will remain, small relative to the capacity for local investigation in borrowing countries. Its activities therefore must have a catalytic component, one that is not being fully exploited at the present time.

A ready extension of this principle suggests the usefulness of sponsoring Bank seminars abroad more widely, even when countries have not been the object of study. This has been done on occasion for other topics. Demonstration of new techniques and exposition of research results could stimulate emulation. In some cases regional meetings might be held; in others, individual countries might be more appropriate. Such a broader program could counteract the inevitable concentration of research upon a limited number of countries, and expose Bank researchers to a greater diversity of developing country views and experience.

A second aspect of dissemination is internal to the Bank. The present system relies primarily on written rather than verbal transmission. Memoranda substitute for discussion. Seminars in regional departments or operating divisions are infrequent. There is evidence that current practice is not entirely adequate. Two mechanisms suggest themselves.

The first is preparation of a new series of reports in a special format for non-DPS staff, in addition to the working papers themselves. These

could take the form of a relatively short - but more than an abstract - statement of the research results within a broader context. It would largely spare technique in favor of drawing out explicitly implications for country application and policy. These statements would be widely distributed, reserving for a narrower audience the original research publications themselves. The latter would remain available on request.

Secondly, the program of Bank seminars should be extended. Every project - as it is being elaborated and even prior to submission for research committee approval - should be the occasion of a seminar in the relevant region or operating department. At the conclusion of the project, a similar presentation of results is indicated. Seminars that are presently scheduled during the research project cycle are largely directed to Bank researchers themselves, that is as it should be. What is proposed in addition is an out-reach to potential users, before and after. These may have been served more adequately in other subjects, but not as regards findings in the income distribution and employment fields.

Care and attention to internal communication can ameliorate, if not resolve, the problems of articulation. It can expose end-users more satisfactorily to what researchers are doing. It can also increase the gratifications to researchers by providing them a wider Bank audience. The activity is one the researchers themselves should undertake; a new layer of specialist translators is inappropriate.

VII. Research Administration

The administrative structure governing the Bank research program has evolved and been formalized considerably in the last several years. It has responded well to felt inadequacies of project preparation, supervision, and evaluation. That makes it unnecessary to dwell at length upon the subject. More attention has increasingly been paid to pre-Research Committee panels drawing together diverse interests within the Bank, to the phasing of projects involving large expenditures, to the need for adequate internal supervision of consultants, and to the standardization of the final evaluation process. We dare say that many of our earlier suggestions have already been anticipated.

To some degree, our present recommendations, given the evolution of the research effort in income distribution and employment, react to what now seems perhaps an excessive formalization of the process. Research projects are considered in an NSF-like fashion, to the possible erosion of a more active management role in positively stimulating the research that the Bank wants especially to see done. Submitted projects are vetted well, but they may not be the most important ones. The Research Committee, because its members have many other responsibilities, have not been an effective force in the establishment of clear research policy guidelines; nor was the attempt to define priorities through a series of research overviews in particular subjects wholly successful.

At this point, therefore, additional flexibility and wider latitude for Bank research management may be the most productive course. Higher professional standards of recent years can stand on their own with less need for continuous vigilance. As a matter of course, management should be able to finance the initial phases of projects - at higher limits than currently imposed - without going through a cumbersome review process. The burden of proof ought to come later after initial results are in. This requires tough-mindedness, because unpromising lines of inquiry will simply have to be ended. But such a policy, if implemented, should lead to a higher proportion of large project successes.

Similarly, at the other end of the research cycle, the present system of project-by-project evaluation is too mechanical. It can hardly uncover research styles and approaches that have been more successful than others. Evaluation of single pieces of research in isolation by committees of different composition seems destined to produce not merely partial, but also rather bland, observations. No project fails to make some kind of contribution; none, taken alone, is a spectacular success. A more useful evaluation framework should be more subject-oriented and recurrent, taking into account projects both completed and underway. Such an internal exercise, performed annually or at longer intervals, could more probably feed back to the determination of research priorities on an informed basis. That review, unlike our own, should be dominated by Bank personnel, with perhaps minority outside representation. Whatever the advantage of occasional outside perception, self-criticism has the virtue of more likely leading on to corrective change. It is only when Bank management and staff come to feel strongly that inadequacies should be remedied that they will; internal discussion is more likely to produce that consensus than outside reports.

Annex

Research Projects

Project Code	Title
670-06	Short-run and Long-run Influences upon Income Distribution
670-09	Size Distribution of Income
670-40	Economic Models of Internal Migration
670-42	Professional Structure in Southeast Asia
670-43	Labor Market in Malaysia
670-45	Labor Force Participation, Income and Unemployment
670-69	Growth and Income Distribution in Brazil
670-83	Evaluation of Latin American Data on Income Distribution
670-84	Growth, Employment, and Size Distribution of Income
670-85	Urban Income Distribution in Latin America
670-90	Labor Market in a Rapidly Growing Economy
670-94	Employment and Income Distribution in Malaysia
670-96	Distributive Impact of Public Expenditure
670-99	Economic Aspects of Household Fertility Behavior and Labor Supply in Northeast Brazil
671-02	Population Growth and Rural Poverty
671-06	Employment Models and Projections
671-08	Evaluation of Asian Data on Income Distribution
671-17	The Analysis of Change in Rural Communities
671-26	Migration Patterns in West Africa
671-27	Social Accounts and Development Models
671-30	Structure of Rural Employment, Income, and Labor Markets
671-31	A Comparative Analysis of Rural-Urban Labor Market Interactions

Project Code	Title
671-36	Income Distribution in Thailand
671-39	Price Intervention in Agriculture
671-41	Indirect Estimation of the Size Distribution of Income
671-45	Programming and Designing Investment: Indus Basin
671-48	Urban Labor Markets in Latin America
671-59	Small-Scale Enterprise Development
671-61	Socio-Economic Aspects of Fertility Behavior in Rural Botswana
671-62	India: Impact of Agricultural Development on Employment and Poverty: Phase I

APPENDICES: REVIEWS OF

RESEARCH RESULTS

INCOME DISTRIBUTION: THE EMPIRICAL FOUNDATION

Introduction

We focus in this Appendix upon the adequacy of the Bank research, upon the measurement of the income distribution in diverse countries and its change over time. The three studies which we principally take up are Size Distribution of Income (5), Redistribution With Growth (4), and "Inequality, Poverty and Development" (1).*

The data requirements for the study of the distribution of income are admittedly highly demanding. Proper measurement, free from transient disturbances and from the systematic effects of different phases of the life cycle of income, among comparable recipient units, and with adjustments for purchasing power differentials among various distinct groups, is difficult to achieve. Adequate measures are rare enough even for developed countries. For developing countries estimates are more likely to be non-comparable and deficient in many respects. They require critical scrutiny and adjustments to reduce non-comparability; and even then, extreme caution must be exercised in interpreting the results.

The discussion here focuses upon several central problems common to the principal Bank research upon the measurement of internal income inequality. These include problems of: (a) inadequate international coverage of the data and estimates; (b) errors in those estimates, relative to what they claim to cover; (c) lack of sufficient concern for definition of the recipient units; (d) disparities between the concepts of income used and those required for proper analysis. The brief discussion will not do justice to these problems touched upon, but it will at least expose the full range of difficulties. We conclude by reflecting on the effects of these limitations on some of the substantive findings.

Data Coverage

Redistribution with Growth (4) contains in Table I.1 a comprehensive cross-section of ordinal income shares for 66 countries, 5 of them socialist, and almost two-thirds of the remaining, developing market economies. The compilation, Size Distribution of Income (5), provides income shares, measures of aggregate inequality, and a few other measures, for 71 countries, 6 of them socialist. A more recent cross-section, "Inequality, Poverty, and Development" (1), covers 60 countries selected almost wholly from (5), the choice having been "dictated by particular judgements about the reliability of data in some cases" (p. 339). This list contains 41 developing market economies, 13 developed market economies, and 6 socialist countries. We shall not discuss the data for socialist countries; both their selective definition of income and their institutional arrangements preclude straightforward economic comparisons of income shares.

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* Full citations are in the Annex to Appendix A.

The large number of market economies for which size-distribution estimates have been assembled suggests a wealth of data. But this impression rapidly dissipates when the lists are examined. The first observation is that some major developing countries in important regions are missing. Thus, for Subsaharan Africa, (1) -- which is the most selective -- fails to cover the more populous countries: Nigeria, Ethiopia, Zaire, and Sudan. Were we to possess a proper typology of developing countries, we would likely find other important omissions for some of the relevant type-classes. Second, the size-distributions each refer to a single year, with few relating to a time span (e.g. , Lebanon for 1955-60). The dates, moreover, vary widely within the period from the mid-1950's to 1971. Thus of the 41 developing countries in (1), 10 countries are covered by estimates relating to years from 1955 through 1960; another 9 by estimates for years from 1961 through 1965; and 22 countries by estimates for the period 1966 to 1971. Since size-distributions can be affected not only by transient elements peculiar to a particular single year, but also by changes over time -- quite apart from changes in per capita product in constant prices -- the time range of one and a half decades introduces elements of non-comparability. It also means that the impressions for many countries are badly out of date and are not a good guide for present decisions.

But the most serious limitation in coverage of data is revealed not in (1), but in (4), in which some effort is made to make comparisons of change over time for income as a whole and the income of the lowest 40 per-cent. The sample is only 13 developing countries; actually 12, excluding Yugoslavia. This is a rather small sample; even were we to assume full statistical comparability, the limited extent of the time interval (six years and not more than ten) means that trends in income inequality, if any, are not easily discernible. That is true without regard for the incompara-bilities in data for the same country at different times. (5) makes apparent how such data come from different sources and refer to different recipient units. Such scarcity of time series relating to size-distributions of income in a sufficiently diverse sample of developing countries, is a major informa-tion lack.

Errors in Estimates

Size-distributions are usually estimated from sample studies of household income (and/or expenditures) or census income questions. Under certain conditions, they can also be derived -- usually only partially -- from the national accounts data using components of factor income that can be integrated with an array by size of income. The commonly observed result is that income totals and factor income components corresponding to size-distribution estimates tend to fall appreciably short of comparable totals in the national economic accounts; and the shortfalls are both substantial and significantly different in relative magnitude for labor and capital income, components associated with recipients placed differently in the income distribution.

The results of Bank research in Latin America, Income Distribution Estimates from Household Surveys and Population Censuses in Latin America:

An Assessment of Reliability (2), emphasize this conclusion. There is therefore little need to labor the point further here. It is not one limited to Latin America. In another World Bank study, Size Distribution of Income in Malaysia (3), the author states (Chapter III, p. 22) that the "mean household income estimated from the Post-enumeration Survey (for 1970) is $264 per month ... and the degree of understatement in PRS income relative to the National Accounts is on the order of 25%". Then the author adds: "Although this might seem quite large, it is in fact not particularly great by the standards of household surveys conducted in LDCs".

Both of these Bank studies, and other Bank research underway on estimation of social accounts matrices, therefore negate the validity of aggregate compilations. They show the incomparability of the surveys over time, and implicitly therefore warn against their use. Yet even those more intensive studies do not undertake much experimentation with alternative adjustments in an attempt to produce a more reliable and comparable set of statistics even on a cross-section basis. It is only when there is such an alternative that the research task is complete: warnings and cautions do not inhibit analysis and even policy conclusions.

Scope of Coverage and Definition of Recipient Units

There is neither consistency in the scope of coverage -- national, urban, etc. -- or in the definition of recipient unit -- household, workers, etc. -- in the aggregate compilations so far emanating from Bank research.

Of the 60 market economies reported in (5) and published without commentary in (4), the coverage is short of national for 8 countries, with some question about the ninth. For Argentina, Burma, Dominican Republic, Greece, and Iran, the coverage is either of the capital city alone, or of urban only; for Guyana, Sierra Leone, and Uganda, there are major geographical or group exclusions. For Thailand (1970), (5) shows distributions for rural and urban households separately, but not aggregated; the ordinal shares presented in (4) are close to those for the urban distribution in (5). For these 9 countries there is thus an important element of non-comparability, associated with limitation of coverage, relative to the distributions for other countries with full national coverage.

For the remaining 51 countries, the size-distributions are for the following types of recipient units, using the terminology of (5): households - 25 countries; income recipients - 12 countries; economically active population - 5 countries; total population, a rather vague category - 6 countries; and per capita - 1 country (the United States, indicating an aggregation of the distribution among unattached individuals with that among families reduced to a per person basis). Distributions among households thus dominate, followed by distributions among income recipients -- whether all or only the economically active population.

A check on the data base of the more recent summary of cross-section evidence on size-distributions of income in (1) indicates that of the 41 developing countries only 2, Uganda and Guyana, relate to an area or group

short of the national total; that of the remaining 39 developing countries, the distributions in 16 countries are among households; the distributions among income recipients, or economically active population, or total population cover 7 countries each; and for 2 countries the distributions are for per capita income. The distributions for the 13 developed countries are among households for 8 and among income recipients for 5. The distribution for all 52 market economies is quite like that for the 51 countries in Table I.1 (4), as described in the preceding paragraph, as it should be since the underlying common source is (5).

Two comments can be made about the possible results of such a mixture of size-distributions referring to different recipient units. First, there is a marked tendency for distributions among individual income recipients to show wider inequality than for those among households. Thus, in (4), distinguishing the 25 countries for which the distributions use household units (Group I) from the 26 countries for which the recipient units are individuals (Group II), the 9 countries with low income (below $300 GNP per capita in 1971 prices) in Group I show an average income share of the lowest 40 percent of 14.2 percent; whereas the 12 countries of Group II in the low income category yield an average of 11.2 percent. A similar comparison of the 10 countries in Group I with the 5 countries in Group II that are in the middle income bracket ($300 to $750 per capita GNP) yield average income shares for the lowest 40 percent of 13.4 and 8.0 percent respectively. For the 6 countries in Group I and the 9 countries in Group II that are in the highest per capita income class ($750 and over), the average income shares of the lowest population group are 17.1 and 14.2 percent respectively. Disparities in income shares of this magnitude within similar ranges of per capita income are too great and too consistently in one direction to be neglected.

Second, and perhaps more important, neither of the widely used types of unit, whether household or individual, stands for equivalent groups of dependent consumers. Households differ in number of members, and in their ages. The distribution of income per household would naturally show a significant positive correlation between size of household and its total income, a smaller number of persons dependent upon lower incomes. The same is likely to be true of the size-distribution among individual income recipients. Earners or recipients of lower incomes, dominated by younger, part-time workers and secondary labor supply, tend to have fewer dependents supported by that income than the higher income recipients who are more usually heads of households. The latter are more frequently of an age in the life cycle where both income and number of dependents are likely to be large. It follows that income shares, say of the lowest 40 percent of households or of income recipients may represent shares of <u>population</u> (whether persons or consuming units adjusted by age) that are distinctly <u>below</u> 40 percent; while the shares of the top 20 percent of households and income recipients represent more than 20 percent of population or of consuming units. The essential point is that these adjustments vary differentially among countries and over time, introducing significant incomparabilities in the welfare implications of the measures.

This comment affects not only the cross-section compilations but also the uses of the shares (and inequality measures) in other applications -- some undertaken by the Bank. It relates to attempts to use the conventional size-distributions to identify people below poverty lines, or deficient in associated consumption levels. Even disregarding the advisability of employing equivalent consuming units rather than persons, or of using the distribution and levels of consumption rather than of income, the need of adequate adjustment to shift from households and income recipients is indispensable.

There are additional major difficulties that apply to intertemporal comparisons. As noted earlier, these include the need for adequate statistical comparability among two or more samples over time and for adjustment to compensate for transient characteristics of the particular years. Analytically most important, and related to the recipient unit, the extent of mobility over time is of critical significance. We want to know how many of the poor and rich of today were among the poor and rich of, say, a decade ago. Clearly, extensive mobility lends an entirely different meaning to comparisons across time of the shares of the poor and the rich than when such mobility is lacking.

A final problem obscured in the cross-section compilations is the very definition of the household or family in diverse cultural settings. Changes in family structure with modernization and income growth impose limitations upon use of unchanging and conventional recipient units. This is over and above the more familiar problems already discussed, and for which partial solutions at least exist.

The Concept of Income

The definition of income is itself not a simple matter. Two observations can be made regarding the Bank results. The first is that the income concept must have differed among countries and years. We know that for some countries (e.g., the United States) sample studies of family and household incomes are limited to cash income and exclude income in kind; that for other countries, households are grouped by total income receipts including gifts and transfers from other households (e.g., Taiwan); and so on. Hence, the multi-country cross-sections must also include elements of noncomparability in the definitions of the income totals; how serious such elements are, we cannot tell at present, because the matter has received insufficient attention.

The second comment is that few size distributions, whether for developed or developing countries, are based on an analytically desirable income concept. That would require, in the first instance, completeness of coverage in its inclusion of both cash and income in kind; of flows from government and other institutional sources, as well as the compulsory drafts that may be imposed by them; and also of receipts and transfers among households. In the second place, there is the need to eliminate or dampen transient, short-term components in annual income, as well as to adjust for the effect of the life cycle upon the income of the recipient unit. Thirdly, the possibility of substantial differences in purchasing powers between the

rural and urban recipient units, and within these large groups, between the lower and higher income groups, has to be considered. And finally, one should note again, for intertemporal comparisons, the possibility of mobility of recipient units among the distinctive size-classes, even after full adjustment.

Admittedly, these criteria are a counsel of perfection. Yet there is value in specifying such analytically desired income totals, if only to induce experimentation that relates the actual concepts to the desired. That can provide a better notion of the magnitudes involved and the consequences of adjustment, even if crude. It can clarify the kind of basic data required to relate to the policy issues implicit in the analysis of the distribution of income.

Conclusion

The previous discussion relates solely to the weakness of the empirical foundation provided by the conventional data on size distributions of income among households or among income recipients. The comments should not be misinterpreted: as denying the value of emphasis on the distributive aspects of economic growth, particularly in developing countries; as negating the ingenuity with which Bank research has attempted to distill findings from disparate data, with increasing caution concerning the limitations of the underlying information; as rejecting analysis of the distributive implications of structural aspects of growth illustrated by relatively simple models employing notional but still plausible parameters; as counseling against introduction into project appraisal and other operations of the Bank sensitivity to possible impacts on internal income inequality. But one is left with the question whether much more experimentation with the underlying data should have preceded (rather than followed) the kind of generalization that was exemplified in the empirical summary of the size-distributions of income of the type provided in Sources (1) and (4), or in publications relating to poverty, or in the compilations exemplified by (5).

Many of the limitations of the data used, relating particularly to the nature of the recipient unit and definition of income have been recognized in the course of Bank research. Yet the natural inference from such limitations to more serious attention to the underlying data was apparently not followed. Instead the presumption has been that the errors are random and do not lead to spurious conclusions. In a subject so wrought with political implications, the attempt to obtain the right numbers for individual countries cannot be so easily dismissed in favor of the aggregates; nor can randomness be assumed when the various effects of recipient unit, size of family, etc., earlier discussed, are considered.

One may wonder whether a closer scrutiny and rejection of a number of estimates, while presenting adjusted data that are more reliable, would have furthered quantitative research more. There is danger that the now readily available Bank compilations can be put to uses that are more misleading than enlightening. There is still time, in the case of the Bank research now underway on Latin America and the Far East, for such counsel to influence the final stages of those projects, as well as the form of publication of the results.

Annex A

SAMPLE OF PAPERS

(1) Ahluwalia, M.S., "Inequality, Poverty and Development", Journal of Development Economics, 3, 1976, World Bank Reprint Series 36.

(2) Altimir, O., "Income Distribution Estimates from Household Surveys and Population Censuses in Latin America: An Assessment of Reliability", November 1976 (mimeo).

(3) Anand, S., The Size Distribution of Income in Malaysia, November 1977, (mimeo).

(4) Chenery, H.B., et al, Redistribution with Growth: An Approach to Policy, Oxford University Press, 1974.

(5) Jain, S., Size Distribution of Income: Compilation of Data, Johns Hopkins University Press, 1975.

RESEARCH ON INCOME DISTRIBUTION

Introduction

The Bank program of research upon income distribution has emerged in a self-conscious, planned fashion. In recognition of the limited investigation conducted elsewhere, the Bank has been prominent in stimulating and pursuing research on income distribution in developing countries. The initial Bellagio conference and subsequent publication of Redistribution with Growth has meant a leadership role that has not been characteristic of all fields of Bank research.

Bank research prospects and priorities were established after careful review of what was and was not being done elsewhere, the likelihood of potential progress, and the relevance to Bank interests. The research strategy, elaborated for and endorsed by the Research Committee in 1975, has emphasized three subject matters:

- empirical, data-oriented, analysis
- construction of economy-wide models for policy experiments
- examination of consequences of policy interventions in a partial equilibrium framework

The first two components of this program have absorbed the lion's share of external resources. More internal staff time has been allocated to the third.

These priorities were chosen to respond to the issues posed to the Bank as it seriously began to grapple with the income distribution question. The data base was limited and uncertain, and called out for improvement in 1975, and it was still impossible to say how the income distribution in even the most important countries had fared over time. Beyond that, there was much talk of iron laws of development, inevitable impoverishment, and the like. The role of public services in offsetting the inequalities of private receipts was a matter of debate and dispute. The characteristics of the poorest groups were known for only a handful of countries.

How to intervene most effectively to reduce inequality and ameliorate poverty - while retaining the market and growth orientation emphasized by the Bank - was also not part of the conventional wisdom. There was considerable appeal to viewing the income distribution in the context of the productive structure, in order to include the second-round effects that direct policy analysis often fails to capture. Hence the relevance of large country models, in addition to research directed to specific policy instruments.

The larger strategy thus made, and for the most part, continues to make sense. The professional quality of the analytical results compares favorably with non-Bank sponsored research in the field. Many have been or are in the process of publication. Bank consultants have been eminently qualified and highly regarded. Question has rightly been raised in Appendix A about the weakness of the compilations of data, and the uncertain yield of the substantial research investment intended to extend the data base. There is no need to rehearse those issues here. The principal shortcoming here is the inability to follow through sufficiently on the strategy to yield findings that can inform Bank and developing country policy.

In the following sections, we evaluate a sample of 16 individual contributions under the three headings noted above. The concern is less with the research for its own sake, than with the implications for future priorities.

Empirical and Analytical Analyses

The research classified under this rubric is largely of two sorts, cross-section analysis of aggregate data, and country studies. Seven works have been examined, three of the first kind [1, 2, 6] and four of the second [3, 4, 5, 7]. Three are book length, four take the form of articles.

The cross-section aggregate research [1, 6] responds to the important issue of how the size distribution of income changes with sectoral, educational, and per-capita income change in a large number of countries. It is clearly the most sophisticated of its genre. The limitations of cross-section analysis are clearly understood and presented. Publication in academic journals was amply warranted.

Still, for Bank purposes, it might have been better to start the other way around: that is, with the substantive issue of the trade-off, if any, between rapid growth and inequality. The cross-section regressions in that context would have figured as one piece of the evidence, rather than being the central analytical focus. A small selected set of countries whose inequality trends had been carefully measured might have been compared with the cross-section predictions. These experiences would have merited comment. More narrowly, the U-shaped curve of the size distribution as per capita income varies might have been assessed more critically as the possible artificial statistical consequence - at the lower end - of minimum subsistence requirements. Finally, other Bank research bearing on international income comparisons might have lead to use of a more meaningful set of measures for per capita income.

These criticisms do not mean that research upon income distribution variability is not useful. Quite on the contrary. The Bank results - properly understood - suggest that great care is needed before affirming the inevitable propensity for the poor to get poorer, and that even relative inequality may not vary regularly. The authority of the result, and its relevance for Bank policy, could have been much enhanced, however, had those

hypotheses, rather than the method, dominated. That is why, in our recommendations, we have tried to stress a policy rather than an academically oriented research view.

Decomposition analysis of the Latin American survey results [2] employs a cross-section perspective somewhat differently. Not only is the single region involved, but the basic question is also another: what is the influence of personal characteristics versus market characteristics in the explanation of inequality. Again, both in the theoretical discussion of alternative decomposition techniques and in their application, the research goes beyond previous efforts. Its technical proficiency is not at issue. What is, is the domination of the substantive concerns by the mechanics. The variables measuring market influences are inadequate - because of the characteristics of the surveys - leading to a statistical decomposition whose interpretation is in doubt - the more so because of interactions with personal characteristics. There is no comparison among the different Latin American countries to see how the results conform to other, indirect evidence. Finally, although considerable effort was expended in order to test the validity of the raw data - which turn out to be highly variable in reliability - the uncorrected information continues to be processed in all cases.

As before, and is characteristic of much of the Bank (and academic) research, the basic limitation is the attempt to exploit a particular set of data, rather than to examine a broader set of hypotheses. Research that does not go beyond the second stage fails to have the impact on Bank and developing country policy it should and might have.

Country-oriented empirical research within the Bank has managed more frequently to cross that barrier, perhaps because it requires broader concerns. The Malaysia study [4] is a case in point. While utilizing information from surveys, it is critical in its evaluation of their comparability, and careful in the inferences drawn. It transcends those particular data to take on a series of policy questions and issues relating to the size distribution and its changes. The study is consequently one that both Malaysian economists and those in the Bank will find helpful in understanding what has been going on; the great irony is that the Bank country economists were largely unaware of its existence.

The construction of a social accounting matrix for Malaysia [5] is also of value, although its principle objective is measurement rather than analysis. A single country focus and a need for consistency between the production and distribution accounts produces a more constructive attitude toward data than has characterized the more global efforts. While more experimentation with different imputation techniques and different assumptions might have been tried, the monograph is evidence that Bank research can take data seriously. One of the motivations is the usefulness of these data for a subsequent modelling effort.

Yet country research can also bog down in too narrow a context. The Taiwan study [3] becomes a virtual catalogue of Gini coefficient decompositions of all shapes and sizes over time, neglecting some of the basic

forces at work that reflect themselves in these coefficients. There is little discussion, for example, of the factors favoring the spread of rural industry in the case of Taiwan, little explanation of the processes by which dualism diminished within sectors, the reasons why technological change favored wage income, etc. Taiwan is an essential component in the puzzle of rapid growth consistent with equity. The study, while a technical advance in its application of Gini coefficient decomposition, fails to draw out those lessons and make them available to Bank and developing country decision-makers.

The work on earnings functions growing out of an extensive study of income distribution in Thailand [7] is of a similar bent. It is the technique that is central more than the substantive results. The article makes its point that better and indirect estimation of the contribution of education to earnings is feasible from survey data including self-employed. It does not, however, much advance our appreciation of the special circumstances of the Thai case. Perhaps the larger monograph underway will. It should. For Bank needs, the substance and the policy must count as much as methodological contributions; that is what differentiates its research agenda from that of an academic institution.

Large Scale Models

The research upon economy-wide, general equilibrium models shares some of the same attraction to technique at the expense of some basic questions. Two large but different models, for Brazil [9] and Korea [8], have been estimated and put through simulation paces. These efforts have been major projects. Their intent was to examine the effects of government policy upon the size distribution of income. Both have made technical advances in theoretical and programming terms. Yet neither lives up to the original intent.

There seem to be three reasons why. One is inattention to the inherent limitations of what remain "standard" economic models for the analysis of the size distribution of income. The basic rules for distributing income to persons, as opposed to economic agents defined by the productive process, are not an integral part of such models. The personal distribution is obtained subsequently by allocating factor income to individuals using static and non-behavioral constants computed from earlier survey and Census results. This is equivalent to saying the rank-ordering of persons does not itself feed back upon the economic (and political) process. In practical terms it also means that inequality within groups is held constant, although both its level and changes are significant in observed performance.

A theory of distribution to individuals is not a simple matter. But until it is explicitly tackled, it will not be possible to examine how the distribution of permanent, or life-time, income varies in response to economic change and economic opportunity. Nothing less than a complete specification of individual mobility, and the variation in individual incomes, is needed. This class of models does not attack such questions. The difficulty of the task, indeed, is one reason why attention might perhaps be

more profitably focused on socio-economic groups. But even then, more than mechanical allocation of labor income and profits is required, and mobility between groups cannot be ignored.

A second limitation of such models is that while nominally they are large, by virtue of including many sectors and groups of income recipients, they are in fact very sensitive to their macro-economic specifications. The interactions among most sectors makes little difference to the outcome compared to assumptions built into the models. In this sense, the models are too simple. Both, in fact, seem to equilibrate by taking some magnitudes as fixed in nominal terms, and allowing the overall price level or the terms of trade to adjust to make real demands and supply equal. Such effects then become the source of the distributional changes. Whether these processes conform to the structure of the actual economies is another matter. In neither case was the issue the subject of empirical investigation. If they are inaccurate or exaggerated representations, then policy conclusions are, of course, much affected, and much weakened. It is difficult to believe, for example, that increased agricultural productivity in Korea goes to naught because demand for output is fixed, provoking deteriorating terms of trade; or that in Brazil inflation improves the distribution because some service incomes do not change while all other wages do.

In the third instance, too little attention has been paid to capturing the differences among clusters of sectors, or groups, rather than multiplying their number. Sheer size is a complication, not merely for calculations, but also comprehension. The crucial parameters like the elasticity of substitution, the characteristics of technological change, and savings propensities get lost in the exercise. The simulations take these for granted in assessing policy impacts, when their changes - partially in response to policy - may be more important.

The upshot of the matter is that these models have had little impact on the analysis of Korea and Brazil, within the Bank or within the countries themselves. It was perhaps exuberantly optimistic to think that such would be the result. Lowered expectations might have been in order. In that context, they can be, and have been, evaluated more favorably and positively. They have advanced Bank thinking about model construction. They have also forced Bank researchers to ponder their common result that little change can be induced in the size distribution even by far reaching policy measures. Yet caution is indicated in exaggerating the significance of that result. Small changes in Gini coefficients can correspond to rather large shifts in the share of income commanded by different groups.

It is important to note that these criticisms and others have emerged from critical discussion within the DRC itself. Indeed, one of the papers under review [10] is a thoughtful appreciation of the characteristics of such models written by one set of the authors after the fact. It in turn has inspired other such analytic work within the Bank, and contributed to discussion at the Bank sponsored second Bellagio meeting. This capacity to learn, and to adjust future priorities is a strong point; what is important is to shorten the perception time, and also to target less ambitiously technically, but perhaps more so substantially.

A contrast in model building is the effort underway in the last few years to construct one for the Muda Regional Economy. It takes its start from a serious effort to estimate regional accounts for relevant socio-economic groups [11]. The ultimate purpose is to measure more accurately the second-round consequences of project investment in the region, whose spill-over potential has been considerable. Both by rooting the exercise in region-specific information, and by developing techniques for ascertaining the indirect project effects, the exercise has been better suited to Bank need. The model in question is less sophisticated than those for Brazil and Korea. Its results, however, should potentially inform Bank policy to a much greater extent. Such research in addition has been carried on in close contact with the Malaysian planning office. The lesson is that there are useful models that can grapple with the issue of distribution.

Specific Policy Instruments

Four papers have been sampled among the diverse output that falls in this category. They each represent a significant aspect of research.

The most general is a recently published occasional paper on malnutrition and poverty that has aroused considerable interest [13]. It seeks to establish that increased income is inadequate to solve the malnutrition problem, requiring other forms of intervention instead. The problem then turns on defining efficient instruments. This research should be the precursor for a whole series of inquiries regarding basic needs. The two basic criticisms of the paper are potentially applicable to this larger set as well.

First is the problem of measuring the consequences of income changes. This depends upon knowledge of the per capita distribution within families. As Appendix A notes, this information cannot be casually derived from data usually available. In this instance, the problem is further compounded by the limited income distribution data for many of the lowest income national units. Although only orders of magnitude are perhaps all that is required at this point, at what point do errors of 10 and 20 percent begin to matter? When basic needs do come down to implementation, surely the inaccuracies must begin to affect the effectiveness of policies.

Beyond the income distribution measurement problem, there are the further difficulties of estimating minimum nutritional standards, as well as the elasticity of intake of nutrients with respect to income. The former are still a matter of controversy among nutritionists. The latter are not constants to be readily applied: they surely must vary widely with custom, the intrusion of advertised processed foodstuffs, the rural-urban mix, let alone traditional economic variables like the prices of other goods.

The monograph thus makes the definition of the problem too easy, when the observed persistence of malnutrition in spite of income growth cries out for more subtle and variegated research. At the level of solution, there is the same simplification. Efficient intervention is required, yet that efficiency is measured by reference to consumer preferences that are rejected by the very necessity of intervention itself. The essence of the strategy

is its delivery system that ignores individual wants. Deciding how much is sufficient, and devising substitute means for allocating the relevant goods and services is a central topic for research.

Despite its limitations, the monograph is an example of how Bank research can attack problems ignored elsewhere. Measurement of basic needs and schemes for intervention are matters that are likely to be of continuing priority in the next several years. The attractiveness of this research style lies in its capacity to eschew larger and general equilibrium approaches in favor of a partial focus. So long as each basic need is considered individually, that may be true; when taken as a composite such independence may well no longer prove feasible and there must be more attention to the interrelationships among them.

A second set of research has been conducted on the distribution of public services across income groups. The size of the public sector in most developing countries makes the potential contribution of fiscal policy to the distribution of real goods and services a significant one. Yet the problem as treated in [14] fails to take into acount differences in the quality of services to persons in different income strata. Nor is there adequate discussion of why the survey on which it is based differs so substantially from an earlier one in which the distribution of educational services is much more unequal. Has there been a real change in Colombia, and why? Or can we safely presume the irrelevance of the earlier Bank study. The study instead concentrates upon its own statistical basis, to the detriment of the substantive issue. Nor are there plans to extend the work, either in the Bank or in collaboration with developing countries. The merit of such research, after all, consists in measurement not for a single country, but for a variety of representative countries. The absence of an explicit policy emphasis to the research effort makes itself felt, not only in what is done, but also what is omitted. What should be conceived as a pilot study to be replicated elsewhere becomes another final product.

The research on sharecropping is of a different style. The basic theoretical contribution that is reviewed here [15] makes significant amendments to a literature that has greatly expanded in the last several years. Its publication in the professional journals, as with much of the related Bank research relating to sharecropping, is a measure of its quality and novelty. What is perhaps more important from the Bank standpoint is the productive relationship between such theorizing and empirical application. Both are proceeding simultaneously. What is less fortunate is that while the structure of agricultural tenure is critical to the distribution of income, the theory, and micro-testing, have not lead on to a more synthetic piece that relates the results to larger issues of agrarian reform. Excellent as the work is, and promising in its continuing extensions, this hiatus does not appear likely to be bridged of its own momentum.

The final paper under review, yet unpublished and only recently completed, also relates to the agricultural sector [16]. It is motivated by concern with the implications of price intervention for the distribution of income and casts the problem in partial and simple general equilibrium form.

The paper makes clear the crucial dependence of the size and duration of the full policy impact upon the mobility of factor inputs and the distribution of assets. The paper is a useful first step in establishing a simple theoretical framework for subsequent application; its contribution to the Bank will depend upon whether the latter is pursued.

Conclusion

This review makes apparent both the high quality and varied character of Bank income distribution research. It has been technically proficient and directed to a wide range of problems. Its quantity should also be remarked upon. The productivity of Bank staff compared with academic environments in which research is a large and regular component of responsibility is quite high. Specific criticisms have related as much, if not more, to the product of outside consultants than of Bank staff.

The deficiencies of the research have related less to its execution than to the erosion of policy orientation and focus as it has been conducted. There has sometimes been a tendency for narrow technique and exploitation of a particular data base to dominate at the expense of the larger substance.

A second limitation has been the failure to sustain more policy oriented research beyond single, isolated efforts. The Bank budget is small and its research agenda cannot be greatly expanded. For that very reason, however, it should be endeavoring to play a much more active catalytic role. This has lead us to stress the potential inherent in closer links with developing country research institutions.

A third characteristic has been a greater faith in large models than was probably merited. There are limits to what can be extracted from them. Systematic study of the second round effects of projects and policies has been slighted in favor of trying to solve everything at once. That lesson now seems well understood. More comparative, country-study analyses over time should be preferred to models that have no story to tell.

SAMPLE OF PAPERS

(1) Ahluwalia, M.S. "Inequality, Poverty and Development", Journal of Development Economics, 3, 1976, World Bank Reprint Series 36.

(2) Altimir, O. and S. Pinera, "Decomposition Analysis of the Inequality of Earnings in Latin American Countries", August 1977 (mimeo).

(3) Fei, J.C.H., G. Ranis, S.W.Y. Kuo, Equity with Growth: The Taiwan Case, 1977 (mimeo).

(4) Anand, S. The Size Distribution of Income in Malaysia, Nov. 1977, (mimeo).

(5) Pyatt, G. and Round, J. Distribution of Income and Social Accounts: A Study of Malaysia in 1970, December 1977 (mimeo).

(6) Ahluwalia, M. S. and J. Duloy, "Poverty Alleviation and Growth Pessimism: A Re-Examination of Cross Country Evidence", Bellagio Workshop on Analysis of Distributional Issues in Development Planning, April 1977, (mimeo).

(7) Chiswick, C.U. "On Estimating Earnings Functions for LDCs", Journal of Development Economics 3 (1976), World Bank Reprint Series No. 44.

(8) Adelman, I. and S. Robinson, A Wage and Price Endogenous General Equilibrium Model of a Developing Country: Factors Affecting the Distribution of Income in the Short Run, Stanford University Press, November 1977 (joint publication Stanford University and Oxford University, U.K.).

(9) Bacha, E., L. Taylor, F. Lysy, Models of Growth and Distribution in Brazil, 1977, (mimeo).

(10) Taylor, L. and F. J. Lysy, "Vanishing Short-Run Income Redistributions: Keynesian Clues about Model Surprises", Bellagio Workshop on Analysis of Distributional Issues in Development Planning, April 1977, (mimeo).

(11) Bell, C., S. Devarajan, P. Hazell, R. Slade, "A Social Accounts Analysis of the Structure of the Muda Regional Economy", November 1976, (mimeo).

(12) Bell, C., P. Hazell and R. Slade, "Autonomous Growth and Project Impact in the Muda Regional Economy: 1967-1972", September 1977 (mimeo).

(13) Reutlinger, S. and M. Selowsky, Malnutrition and Poverty: Magnitude and Policy Options, World Bank Staff Occasional Paper No. 23, 1976.

(14) Selowsky, M., The Distribution of Public Services Across Income Groups: A Case Study of Colombia, May 1977 (mimeo).

(15) Bell, C., and P. Zusman, "A Bargaining Theoretic Approach to Cropsharing Contracts", World Bank Reprint Series No. 45, American Economic Review 66 (September 1976)).

(16) Bertrand, T. "Market Interferences and Income Distribution: A Methodology for Studying the Agricultural Sector in Less Developed Economies", August 1977, (mimeo).

RESEARCH ON EMPLOYMENT

Introduction

This review is based on a sample of over twenty research papers 1/ relating to employment questions produced during the last few years. An evident feature is the generally high quality of the output. Indeed a number of pieces have already appeared or are about to appear in learned publications, and many of the authors have been acknowledged as experts in the field. On the other hand, the relationship between the subject matter of the research and the operational needs of the Bank has not always been evident. Perhaps a reflection of this lack of impact is the judgment in [4] that these standards evident in the research have not always been complemented in the Bank's country economic reporting.

The impression created is a series of papers that do not relate to any clear research strategy, although clusters of interests can be identified. In some cases successive or even contemporaneous researchers did not seem to be interacting. And while the bibliographical essays have provided useful summaries of where the field is, they do not seem to have guided continued Bank research or to have suggested policy implications. Their number - five, [5], [9], [10], [17], [19] - accordingly seem excessive. Frequently contracted out to consultants, the reviews languish for want of translation into more suitable Bank form. The fault is not with the quality of the papers, nor their excessively theoretical perspective. It rather lies with the limited resources for follow-up research, and definition of those priorities.

This impression partially derives from the diverse form of the research results sampled - conference proceedings, working papers, division papers, policy papers. It also partially reflects the decentralized character of Bank employment research. Although the Employment and Rural Development Division assumes principal responsibility, several other divisions engage in complementary studies. The lack of focus of the work as a whole - which this Appendix includes, rather than a narrow review of the Division - nonetheless should be a matter of concern.

The main substantive categories of the research, and the associated papers, cover the following topics; the organization is our own.

1. Rural Employment
   [1], [2], [7], [8], [9]

2. Urban Employment
   [10], [14], [22], [23], [24]

3. Rural-Urban Migration
   [3], [11], [12], [15], [16], [18]

1/ Enumerated in the annex.

4. Education
   [13], [16], [17], [19]

5. Shadow Wage Rates
   [15], [21]

The basic conceptual framework seemingly underlying the research relies upon differences in the way urban and rural labor markets function, with a theory of rural-urban migration to link the two. In addition, there has been emphasis upon the segmentation between formal and informal labor market in the urban sector. Education has been singled out for special attention because of its influence upon the structure of wages and its relationship to employment opportunities. Shadow wage rates have been studied because of the obvious relationship to project design and selection; the topic also brings together many of the considerations relevant to the actual performance of labor markets.

Implicit in much of the research is the presumption of an unemployment or underemployment equilibrium. Reliance upon segmentation to produce those results, however, may have been overplayed. Much more attention to the adjustment process, especially over time as the characteristics of entrants in to the labor force change, may well be indicated, as is pointed out in the text.

Rural Employment

After an earlier period in which rural unemployment was believed to be a potential source of "cheap" urban growth, followed by a series of studies suggesting that rural labor markets were in fact working, a more balanced and realistic concern with the need to create additional employment opportunities in the rural sector has come to prevail.

The Bank's work in drawing attention to rural, non-farm activities as a source of employment is therefore much to be welcomed. A review of the issues posed by such a strategy [1], a case study of Taiwan [8], and advocacy of small enterprise as a means of providing employment [9] are among the contributions in this category. These are atypical products: two are highly policy oriented, [1] and [9], and one [8] is very highly descriptive rather than analytic, and served as a factual basis for [1].

For all the usefulness of the facts organized in the Taiwan study, one is still left unsure why in Taiwan the increased demand for non-farm goods in the rural sector - characteristic of almost all developing countries - was met by supply in the rural areas. One answer seems to be the relatively well developed infra-structure and favorable conditions of labor supply because of agrarian reform. Such hypotheses are barely specified, let alone given adequate test. More studies of successful, and also unsuccessful, historical experiences are indicated. But they require a firmer analytic foundation that clarifies the factors permissive of capital mobility to the countryside.

Both of the policy focused papers - themselves not really research - suffer by reason of lack of prior research to draw upon. They are forced to reach conclusions on an indequate knowledge base. They are reviewed here because they do put together what little is known in a sensible and synthetic way. Because of inadequate opportunity to conduct new inquiries, however, they make inadequate reference to broad developing country historical experience and earlier efforts to introduce small enterprise in rural areas. The data analysis in [9], for example, is too partial to sustain the strong recommendations made for a large Bank effort in this area; the observed labor intensity of small scale enterprise is not adequately explained. The review of policy issues in [1] is not rooted in firm intellectual foundations.

These papers have borne fruition in the decision to undertake a more comprehensive research project to redress these deficiencies. It is important that such an investigation go beyond the particular statistical surveys it may conduct to the actual historical policy experience of many individual countries on a comparative basis.

A positive example of what such comparative analysis can yield is the review of public works programs in developing countries [7]. Its analyses of actual experience clarified many of the circumstances conditioning success or failure of such efforts. The research directly informed subsequent Bank issues and policy papers on the same subject. The style of research, and the culmination of the process in Bank relevant documents, are an indication of what should be the norm rather than the exception.

The Bank has also concerned itself with the design of projects to improve the productivity of the small land-holder. One large research project, the Analytics of Rural Change, bears upon such policies. The paper considered here on the rural household [2] is one of a related series that has resulted from the project. Its explicit theoretical and econometric research style contrasts with the papers considered above. It is illustrative of how technique can nonetheless be compatible with substantive interest in the responses of individual economic units to policy interventions.

Inevitably, however, the technique also influences the range of permissable conclusions. Less restrictive, alternative specifications might have yielded different results. Certainly the short-term character of the model makes the calculated impact of price changes suspect. Production functions that are constant in returns to scale and neutral in technological progress are of a special kind. They may be the more questionable in view of the lack of statistical significance of the capital parameter.

The larger issue, however, is that resort to sophisticated econometric technique is imposed by limited, not extensive information. Research such as this, correctly seeking to integrate consumption, production and labor force participation decisions, should be pursued at the Bank using the extensive data available from Bank projects themselves. These afford an opportunity, almost unique, for virtually controlled experimentation. At the moment, only the capital-labor substitution project [6], seems to have exploited this access. It, cut off from a large analytic context, does not do justice to the richness of the possibilities.

Urban Employment

Much research on employment in the urban sector in recent years has been based upon the distinction between formal and informal labor markets, the former with barriers to entry, the latter subject to competitive market clearing forces. Bank research is no exception.

While there is much to the differentiation, and a whole series of papers exploit it [10], [14], [12], [15] and [16] (the latter three are discussed in the section dealing with rural-urban migration), the distinction can be exaggerated. The informal sector is itself quite heterogeneous, affording increasing employment opportunities in some of its sub-sectors, while contracting in others. Nor are barriers entirely lacking. Information, capital, and quite likely a series of personal contacts are necessary to set up even as a street trader. Empirical studies have confirmed, quite contrary to initial expectations of many, that the informal sector is not peopled dominantly by migrants who have been shunted off and marginalized.

The main point is that Bank research in particular, instead of perfecting and adapting what is a dominant mode of academic analysis, might encourage a fresh look at the heterogeneity of urban employment opportunities. This sense, and the need to introduce a more dynamic view of the mobility among such opportunities, seems to have motivated proposals for further Bank research in urban labor markets [23]. Such a study requires a stronger analytic structure. Here is a fruitful, but still apparently unconsummated opportunity for collaboration between those who have been engaged in more theoretical efforts, and those with good empirical instincts.

An example of such a combination is the synthetic discussion of the informal sector in [14]. It brings to bear the mounting Bank empirical evidence relating to such labor markets. That effort stands in contrast with the review of alternative theories in [10] that has limited concern with application, and does not direct itself to developing countries in a convincing fashion. The structure of wage differentials economies can efficiently tolerate is central to the latitude for income redistribution in the urban sector in developing countries. Unfortunately [10] does not shed much light on the relevant determinants.

Bank research along theoretical lines has not provided new tools, or classifications of labor markets that subsequent empirical research might utilize. Its forte has been its extension of other research and its strength in synthesis. Bank empirical work has been perhaps most productive in identifying the urban poor. Among the studies of that type, [22] is useful in bringing together what has been learned, and specifying the data requirements for accurate statistical mapping of urban employment and poverty. It is also one of the few papers prepared with the country economist reader explicitly in mind. For all of that, its failure to articulate a policy rationale, dilutes some of its impact. It is too comprehensive to serve as a manual, and too specific to raise the basic questions of how trickle-down works through employment creation.

Rural-Urban Migration

The papers in this category overlap those that relate more explicitly either to the rural or the urban sector. Most have been theoretical extensions of the imperfection- cum-search models of Harris-Todaro vintage. They thus start from specifications of rural and urban labor markets, and focus on unemployment as the equilibrating variable setting the market determined wage rates in each.

The model, as set out for example in [12], is not without limitations. It gives a role to migrant workers as the marginal urban labor force that is inconsistent with what we know about the selective character of migration and the jobs they actually take. It makes the informal sector a caricature of what it is in reality, where service employees frequently earn higher incomes than those in traditional manufactures. It is couched in terms of simple, one-period probabilities that ignore the dynamics of the search process. The latter, conditioned as it is by the availability of income transfers, attitudes about mobility, and institutional characteristics of labor markets is presented in terms that are much too simple.

The model thus fails to be fully descriptive of rural-urban interactions. At one level, it is entirely neo-classical in its assumptions of maximization and wage, price and quantity adjustments; at another, in the formal sector, it precludes terms of trade or wage changes. Little attention has been paid to the characteristics of decision-making under uncertainty, despite the central role of the probability calculus in the model. Nor does it deal with uncertainty in agriculture where the vagaries of weather, prices, crop disease, etc. are at least as significant as the uncertainties of employment in the urban sector. Subsequent Bank work as in [16], [3] and [21] enter into some of these aspects, but still within the restrictive ground rules of such search models that rationalize unemployment, rather than focus on the mechanisms of employment creation.

The policy instruments in such models are few. Usually they are limited to altering the fixed urban wages, or modifying the shadow wage rate - of which more shortly. A special Bank perception of the problem, directed to the alternative means of coping with massive migration through investment in regional poles, rural public works, special wage subsidies in urban areas, etc. is generally lacking. The Bank research, high in quality and professionalism, blends with that of the field as a whole.

Education*

Bank research on this subject has been concerned with a variety of the dimensions of influence of education upon employability and earnings. Two of the papers examined are country specific, [13] and [16]; two focus on the appropriate amount of resources to be allocated to training, [17] and [19].

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* A separate external panel is reviewing Bank activities in the field of education and training.

The study of Malaysia [13] exploits the income and school-leavers surveys for that country. It is a professional, but self-contained exercise. The emphasis upon a statistical search for significant associations is perhaps carried too far. Regression results that include a variety of associated variables (e.g. race and education) are not likely to be robust, the more so when education is entered as years of schooling independently of its quality; older persons with equivalent schooling may have had far different training. The parallel study of Zaire [16] is subject to these same limitations.

Of more concern, however, is the limited attention to the social returns in both cases. Central to that question are the extent and character of unemployment experienced by the educated, and their social productivity. If their ultimate employment, after a period of waiting financed internally by families, leads them to redundant white collar and civil service work, the social returns obviously fall below the private return. Calculating the latter, in the absence of specifying whether education has a genuine productivity effect per the human capital approach, or whether it only serves a credentialling function, merely confirms an association between education and market wages. This issue was not broached in the two country studies, thus limiting the policy guidance the Bank might extend.

Social returns were the focus in [17] and [19], but within a restrictive framework that fully accepted years of schooling as productivity enhancing. The key addition in [17] is the assumption that education should be directed to those with greatest ability. The latter is presumed to be measured by IQ and to be independent of wealth. Such a policy for educational investment ignores the poor of low measured ability who may be so as a consequence of centuries of poverty and neglect. The results have only a limited policy interest, presuming as they do a prior set of equalizing opportunities that education itself is intended to provide. [19] presents more useful results. It shows that schooling alone - in the absence of complementary investment in health, nutrition, etc. - cannot increment ability (and earnings) significantly.

Both of these papers, while aiming at central policy issues, fall short of the mark owing to their limited empirical content. If the questions are worth pursuing, they should be pursued in depth. In a topic such as education, in which the Bank finances projects, and can influence policy, it is disappointing to find only single efforts, and not a coherent research effort directed toward production of a convincing policy paper. In part that is because these papers have been incidental to the large Bank effort relating to education. But why then devote resources to unrelated, single issues.

Shadow Wage Rates

All of the prior discussion bears on the usefulness of the market wage as a measure of social productivity. The latter is what counts for analysis of individual projects. Two papers, [15] and [21], explicitly deal with this question. Most of the others do so implicitly in their characterization of the forces that determine the market wage.

The two papers complicate, instead of simplify, taxonomies of shadow wage rates under different labor market conditions. Bank research should be going in the opposite direction. The Bank requires translation from the ideal to the practical. The merit of taking the informal sector wage as the shadow wage is that it is readily accessible. These papers, and still other Bank research, correctly show the limitations of such a measure when market wages also depend upon migration, can influence efficiency, reflect private returns to education, etc. The challenge is to carry the research one step further to develop feasible alternatives. It is relevant that the research reviewed was incidental to actual application, and emerged from theoretical rather than practical interest. Much more concern with shadow wages is to be found elsewhere in the Bank. It is not obvious that such a division of labor is warranted.

Conclusion

This brief review has not been intended to single out particular papers for praise, or others for criticism. Virtually all in fact are of high professional quality, as their increasing publication rate attests. Rather the intent has been to expose a style of Bank research upon employment questions, which seems not fully to have satisfied Bank needs, or to have exploited Bank comparative advantage.

Among the factors responsible are: inadequate attention to policy interventions; exclusive focus upon particular data sets; insufficient attention to project design and evaluation; failure to follow through individual efforts to a coherent Bank policy paper, and lack of a coherent focus for research - in part the consequence of the decentralization of the program. It is clear we are imposing different, and higher, standards than research is generally required to satisfy. That is a measure of how far the Bank's research program has come in a relatively few years, and the special needs it must satisfy.

SAMPLE OF PAPERS

(1) Anderson, D and M. W. Leiserson, "Development Issues in Rural Non-Farm Employment," Report No. 1577, April 15, 1977.

(2) Barnum, H. N. and L. Squire, "An Econometric Model of Agricultural Household," undated.

(3) Beenstock, M., "Risk, Unemployment and Rural Urban Migration," May 31, 1977.

4) Beenstock, M. and M. W. Leiserson, "Functional Review of the Treatment of Employment in the Bank's Country Economic Work," (Draft) July 1977.

(5) Berry, A. and R. H. Sabot, "Labor Market Performance in Developing Countries," November 1977.

(6) Bose, S., "Some Aspects of Unskilled Labor Markets for Civil Construction in India: Observations Based on Field Investigation," WBSWP No. 223, November 1975.

(7) Burki, S.J., et. al. "Public Works Programs in Developing Countries: A Comparative Analysis," WBSWP No. 224, February 1976.

(8) Ho, S. P. S., "The Rural Non-Farm Sector in Taiwan," September 1976.

(9) Industrial Development and Finance Department, "Employment Creation and Small Scale Enterprise Development," March 22, 1977.

(10) Lal, D. "Theories of Urban Wage Structures in Developing Countries," September 30, 1976.

(11) Lipton, M., "Migration from Rural Areas of Poor Countries: The Impact on Rural Productivity and Income Distribution," August 1, 1977.

(12) Mazumdar, D., "The Theory of Urban Underemployment in Less Developed Countries," WBSWP No. 198, February 1975.

(13) Mazumdar, D., "Education and Employment in Urban Malaysia," August 1975.

(14) Mazumdar, D., "The Urban Informal Sector," World Development, August 1976.

(15) Mazumdar, D., "The Rural-Urban Wage Gap, Migration and the Shadow Wage," Oxford Economic Papers, November 1976.

(16) McCabe, J. L., "Education, Administered Wage Rates and Size Distribution of Income in Urban Zaire," November 1976.

(17) Pinera, S., and M. Selowsky, "The Economic Cost of the 'Internal' Brain Drain: Its Magnitude in Developing Countries," WBSWP No. 243, September 1976.

(18) Schuh, G. E., "Out-Migration, Rural Productivity and the Distribution of Income," August 1, 1977.

(19) Selowsky, M., "A Note on Preschool Age Investment in Human Capital in Developing Countries", Economic Development and Cultural Change, July 1976.

(20) Stern, N., "On Labor Markets in Less Developed Countries," March 1977.

(21) Stiglitz, J., "The Structure of Labor Markets and Shadow Prices in LDC's," August 1, 1977.

(22) Webb, R., "On the Statistical Mapping of Urban Poverty and Employment," WBSWP No. 227, January 1976.

(23) Webb, R., "Proposal for Research on Urban Labor Markets in Latin America," December 1976.

(24) Webb, R., "Framework for Research on Urban Labor Markets," December 1976.