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RESEARCH ADVISORY PANEL
DRAFT REPORTS



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General Research Advisory Panel - Draft reports - Volume 1

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OFFICE MEMORANDUM

TO: Mr. Hollis B. Chenery

DATE: December 13, 1977.

FROM: Bela Balassa

SUBJECT: Research Requirements in Industry and Trade

1. In response to your memo of November 10th, Messrs. Balassa, de Vries, Keesing, Laursen, Moore, Walstedt, Weigel, and Westphal met to discuss future research requirements in industry and trade. There was general agreement that the resources presently available for research in these areas are inadequate for the Bank's needs. At the same time, the participants at the meeting agreed that first priority should be given to ensuring the practical application and dissemination of research results. There is further need to extend research in areas presently under study, so as to establish a "critical mass", and to undertake research and establish a capability at the Bank for continuing work on manufactured products. This would require, even excluding research on additional worthwhile subjects, a simultaneous increase in manpower and in research funds.
2. The need for practical applications and dissemination is particularly apparent in regard to the highly successful research project on Programming in the Manufacturing Sector. It is of further importance to ensure that research on development strategies finds operational application in country work.
3. Among research areas in industry, the research project underway on small-scale industries would require a follow-up as well as practical applications. Topics of interest in this area include the efficiency of small-scale industry, subcontracting, and the choice of technology. The latter subject is of more general interest, transcending the scope of small-scale industry, and a research program on the subject is being developed. This would cover, among other things, the availability of labor-intensive techniques and the motivation on the choice of techniques.
4. Several research areas bridge the fields of industry and trade. In conjunction with the need to establish a capability for continuing work on manufactured products, it is proposed to examine prospective changes in industrial location as between developed and developing countries in regard to intermediate products and engineering industries.
5. Among intermediate products, steel, petrochemicals, paper and fertilizers offer particular interest; in some instances this would build on existing Bank work. In the case of these products, existing information on new investments should be consolidated, together with demand projections, in a model framework so as to indicate efficient locational patterns and to serve as a guide for Bank investments and policy advising. In the case of engineering industries, the international division of the production process through the trade of parts, components, and accessories offers special interest.

6. Changes in industrial location are influenced by the policies followed in the developing countries and by market constraints in developed countries. As to the former, studies on the experience of semi-industrial countries would need to be complemented by work on manufacturing growth in non-industrial countries and in natural resource-rich countries.

7. Market constraints in developed countries would need to be examined on an industry-by-industry basis in the United States, Western Europe and Japan. In this connection, attention would need to be given to the extent of market penetration, the "danger points" that may trigger protectionist pressures, and the replacement in the markets of developed countries of other developed country suppliers by developing country exporters. In the case of Japan, resistance to market penetration by developing countries and these countries taking over Japanese markets of textiles offer particular interest.

8. Another research area worth exploring is intra-LDC trade. This could be defined after the completion of Mr. Laursen's paper on the subject. The economic effects of national self-sufficiency in foodgrains could also be usefully examined, together with possible alternatives, including regional self-sufficiency and participation in international trade. A further topic of interest for the New International Economic Order in general, and the UNCTAD commodity schemes in particular, is the structure of marketing and the resulting distribution of the gains from trade among producers, traders, and consumers, in selected primary commodities.

9. These are some other research areas relating to industry that may be worth pursuing. They include the financing of industrial development, including the growth of financial intermediaries; the financing and insurance of the exports of machinery and equipment; the operation of public enterprises; and second-best shadow pricing rules for industrial investment.

10. A memorandum on "Topics for Industrial Research", written by Mr. Moore is enclosed. This memorandum complements the medium-term draft program on trade and commodities that was distributed on December 7th.

cc: Messrs. Qureshi, Fuchs, Gordon, de Vries, Hyde, Moore,
Keesing, Laursen, Walstedt, Westphal, Weigel
DPS Directors, Trade Steering Group

Enclosure
BBalassa:nc

OFFICE MEMORANDUM

TO: See Distribution

DATE: December 5, 1977

FROM: Frederick T. Moore *F.T.M.*

SUBJECT: Topics for Industry Research

At the meeting this morning I agreed to write down the list of topics for research in industry that I had. These topics are of concern in operational work and most of them could be undertaken in the form of case studies.

1. Small Scale Industries: There are a number of sub-topics here, but a key question that needs to be addressed is: Are SSI efficient users of capital and labor, and if so, in what industries? So far the Bank's programs have accepted that SSE are efficient users as an act of faith. There is little hard evidence to back this up.
2. Programming Models in Industry. This work got off slowly and has had real success in the Egypt fertilizer model, the SE Asia and India models. The work in this area is in immediate danger of being terminated. There is a whole "cascade" of modelling work that needs to be pursued: investment planning in a sector for a country; allocation of output within firms in the industry (the locational aspects are important); planning output within the firm; linking sector models to obtain an economy-wide model; inter-country locational models for investment and output planning. A continuing effort is imperative or we lose momentum.
3. Studies of the engineering industries (or call them capital goods or machinery). These industries are critical for industrial development because of several characteristics; they tend to be efficient at small scale; they tend to be labor-intensive; the demand is highly income elastic; they have strong backward and forward linkages; and, there are definite export possibilities. Case studies are needed.
4. Financial institutions and industrial growth: The Bank has a long history of lending to financial intermediaries. A fresh look is needed at the relationship between the growth of these institutions and industries growth requirements. What kinds of specialization are called for? When? What are the conditions precedent and the conditions for success? What incentives and policies will stimulate the right kind of development? How should the future Bank programs be aimed? Included here are problems of establishing capital markets and venture capital types of institutions.
5. World location of industrial capacity: The Bank should take a hard look at the targets of the Lima Conference on the location of capacity of key industries in LDC's. Will it happen automatically? Will it be efficient? What are the gains and losses in trade and in market control? What are appropriate Bank responses?
6. Public sector behavior and performance: Much of industrial lending goes to public sector corporations. We need to know much more about

their relative efficiency, whether they are really implementing multiple objectives, what measures should be applied to them, etc. Case studies plus other studies on decision-making in these circumstances are required.

Finally, there is another research project, that does not fit neatly into the industrial framework, but is nonetheless important:

7. Short-cut methods of shadow pricing and second-best applications in industrial projects. This is one I hope to formulate as a research project (with D. Schydrowsky) and present to the committee. It is a follow-on to the project started by B. Balassa.

I suggest, in the write up, there be a separate section on trade and on industry.

Distribution:

Messrs. Balassa, B. King, de Vries, Weigel, Westphal, Keesing,
Walstedt, Laursen.

Messrs. Gordon, Chanmugam, Hyde

FTM:adh

WORLD BANK / INTERNATIONAL FINANCE CORPORATION

OFFICE MEMORANDUM

TO: Mr. David Gordon, DFC

DATE: November 22, 1978

FROM: Benjamin B. King, DEDDR *BBK*

SUBJECT: Trade in Manufactures

I am forwarding Don Keesing's memos (attached) at his request, but would like to say a few cautionary words which may place his admirable enthusiasm more in context, at least as far as this department is concerned. Here are some points worth noting:

(i) We have an informal agreement with Helen Hughes that EPD will gradually take over the reporting function on exports of manufactures. The modalities of this have still to be worked out, but the idea is that a group in our Industry Division (about 3 professionals plus research assistants) would then be free to do research and give back-up advice.

(ii) This allocation of resources would, of course, be depleted to the extent that WDR continues to preempt so much of the group's time. It is my hope that an ad hoc nature of WDR organization will ultimately be replaced by a more stable one. There is some indication of this.

(iii) It is worth noting that the main orientation of this department is micro rather than macro. While the two can never be wholly separated, it makes more sense to place the emphasis on macro trade matters elsewhere, primarily in the EPD.

(iv) There has, as you know, been a severe constraint on DPS staff resources. For increases at the margin, if any, there are many competing claims.

(v) I'm not sure that I share Don's preference for generals; lieutenants, sergeants and privates have their place, if properly led!

Attachments

cc: Mr. Chenery
Mr. Karaosmanoglu
Mrs. Hughes
Mr. Stoutjesdijk
Mr. Balassa
Mr. Streeten
Mr. Acharya
Mr. Westphal
Mr. Keesing

OFFICE MEMORANDUM

TO: Mr. D. L. Gordon, Chairman Industry & Trade Research Steering Group
 (thru: Mr. B. B. King, Director, DED) *BBK*
 FROM: D. B. Keesing, WDR Core Group/DEDND *DBK*
 DATE: November 17, 1978
 SUBJECT: Need for More Work on Trade in Manufactures

1. The attached memorandum of August 21, though hastily written for internal purposes, captures some of the urgency of expanding our work on trade in manufactured products. Thus, it may be useful for the Steering Group and for the Research Advisory Panel on Industry and Trade.
2. Because of its narrow purpose and focus, the memorandum does not discuss either the wider context and history of work in this subject, or how new policy studies would relate to existing and proposed research. However, the Steering Group and Advisory Panel are almost certainly so well informed on research projects that they can work out most of the connections for themselves.
3. A few points might be useful to clarify the context. When our Economics of Industry Division work program on manufactured exports from developing countries was launched in January 1976, I recommended a phased expansion to a staff of at least four to six professionals. In my judgment this number would still be highly desirable, though whatever the number, our main need is for very experienced people in this area. At one time, over a year ago, we reached a level of three people (only one of them senior), but one of the more junior people (Kemal Dervis) was soon diverted to other work, the other is in process of leaving, and I have been pulled away to work full time on the second World Development Report. So we are now back nearly to zero.
4. In regard to research, I believe that with more staff, much useful research could readily be designed in this area to match some of the subjects mentioned. However, with no staff and not enough time to do existing research, it would be quixotic of me to put new proposals on paper. Our first need in trade is staff in my group or somewhere!
5. Whatever may be decided on the future of trade work in the World Bank, I believe that what has happened to this small program on manufactured exports illustrates some of the problems we run into, in the Development Policy Staff, from insufficiency of resources and inability to concentrate the ones we have. Right now we are badly overextended in trade, and unable to meet a widely perceived need to follow up the work we have already done, except on the basis of a fraction of a man-year of work here or there, by overworked staff at the cost of some other pressing priority.

DKeesing:mmm

Attachment

cc: Recipients of August 21 memo;
 Mr. S. Bery, VPD

OFFICE MEMORANDUM

TO: Mr. Benjamin B. King, Director, DED

DATE: August 21, 1978

FROM: Donald B. Keesing, WDR Core Group DBK

SUBJECT: New World Bank Requirements for Work on Trade in Manufactures

1. World Bank requirements for work on trade issues, and especially developing countries' manufactured exports, are in the process of shifting and expanding in ways that call for rethinking our work program and objectives.
2. Up to now our program in this area has been designed to serve the internal needs of World Bank operations through a combination of reporting, advice, mission participation and practically-oriented research. The expectation has been that there would be a useful spillover for the academic community and other specialists in development, and the participants would also engage in policy work part of the time; but these have been viewed as side benefits rather than principal objectives of the work program. Now with the World Development Report raising new expectations by concentrating heavily on trade issues, we have to reevaluate our objectives.
3. The internal requirement is as strong as ever. In practically all the large developing countries, the Regions are mounting efforts to analyze industrial issues and needs in greater depth than before, with much emphasis on trade questions and policies relating to exports. Many smaller countries are becoming concerned with their industrial exports, and are asking for missions and advice. If I had the time, I could fill up my calendar for the next year and a half, twice over, with missions along these lines; and there is also a tremendous matching demand for advice here at Bank headquarters, on the work being done and the recommendations being made. At the same time there continues to be intense interest in our reporting and our projections work; the demand is especially great for projections by country and region, and estimates of what products have strong prospects in what countries, though, of course, we are generally unable to provide much guidance here. Our research based on interviewing of firms is also very well received. The Regions involved are consistently interested in the research on export marketing. Research which we would like to do, on the marketing, technical servicing, and financial aspects of exporting capital goods, would be enthusiastically welcomed. In all these respects the work program as it is now conceived seems well aimed toward the Region's needs. The big problem has been, of course, finding staff and time to do the job, in face of inadequate staffing and constant competition from policy work.
4. The newest demand comes as an outgrowth of recent Bank policy work in the trade field, especially the World Development Report. Suddenly the Bank has been seen by the international development community, and its member nations, to have a capability to do impartial, in-depth, quantitatively-based reporting and analysis on developing countries' trade prospects and surrounding policy issues involving developed countries as well as developing ones. Our perceived capability in this area relates so far mainly to manufactured goods. The Bank's initiative in analyzing

these subjects, and its leadership in suggesting what is needed, have been enthusiastically welcomed by the Bank's Executive Directors and the member countries they represent. We have also received a very favorable reception by the press and by people and organizations that can be taken as representative of the "intelligent laymen" in this field--people concerned with influencing policies, making business decisions, and the like.

5. In response to this demand, it now looks as if WDR work, or the equivalent, will be required beyond WDR II, and trade, protection and related issues will be a major subject in every successive WDR. This already poses a difficult challenge since it becomes hard to say something new on the policy front, without a lot of new work. But the WDR requirement may be symptomatic of a bigger need.

6. This is a field in which public interest runs high and can be expected to persist in years to come. No other set of issues is more on the minds of the world's policy-makers and business leaders in regard to development--the main rival is the debt and private borrowing situation, where the Bank is also becoming a major source of reporting and analysis. To our surprise we have found that in trying to do careful, quantitatively-based reporting and analysis of trade issues, building on recent numbers and Bank projections, we are pioneering and filling a gap, despite the work already being done by other international agencies, the academic community, business writers and commercial researchers. The public and governments alike appear eager to see us do more. In view of the importance of trade for the developing countries, Bank management at the highest levels is also eager to see us do more, provided we can do it well and deliver something useful to the international community. Thus, we now face a need to raise our sights in our work program and think about what analyses in depth would be fruitful in meeting the needs of international decision makers and the broader public.

7. Presumably we would require a widely published and circulated, carefully produced, and quality-controlled output, designed to meet internal needs of the Bank as well as outside needs. There may be a tremendous potential here for contributing to the Bank's prestige and public visibility, and even more important, for influencing world opinion and contributing to development, but only to the extent that the job can be well done. With the Bank's reputation at stake it is essential that the work be of good quality and well aimed at questions of great interest, suitable for careful, quantitative, balance analysis.

8. I have a sense that there are plenty of questions of this type, though there are also issues where we would want to back away, either before or after making an analysis for our own inside purposes. It also seems to me that the pressures on the Bank to look at some of the trade issues, and to say more than what is said in WDRs, are likely to become overwhelming, so we had better start getting ready (and staffed) to do some good work in this area.

9. Let me cite examples of work that may be needed.

--In regard to protection, where our WDR I discussions have been well received and have raised expectations for more in the future, we would fill a big gap if we would analyze carefully the impact of major protective measures--such as EEC and/or U.S. textile quotas, the new orderly marketing agreements in footwear, restrictions and minimum price schemes in steel--on the growth prospects of individual developing countries or groups of countries. Here, of course, my textile and clothing paper (when it finally gets finished) helps to give us a start, as do our WDR background papers and EPD's efforts to get together data on protection, but much more may be needed.

--There is a need to analyze, more than we have yet done, what policies the developing countries would be wise to follow in the face of mounting protectionism in developed countries.

--Related to this, more work is needed on trade in manufactures among developing countries: the nuts-and-bolts details and trends, the potential benefits, possible measures to promote this trade, and surrounding policy issues, some of which involve basic questions as to the extent to which developing countries should design their own technologies and consumption styles. There seems to be much interest in our doing a technically-sound analysis here. Even if we are not very optimistic about the possibilities, we are likely to be asked to spell out our reasoning and evidence.

--We must not neglect our bread-and-butter questions regarding trade and industrial policies that developing countries should follow. Here we are likely to find that with the added stimulus of WDR work we will have new things to say, leading to publishable papers. For example, there may be new things to be said regarding policies in countries with special characteristics--least developed, very small, very large, mineral-rich, etc. Certainly we need more work, including studies of Bank experience, on industrialization and trade outside the main semi-industrial countries in which past research has been concentrated. As a result of WDR work, and/or the Robinson-Dervis work on Turkey, we might also find new things to say regarding such matters as distributive and poverty-alleviating affects of alternative trade policies, and lessons of experience in regard to transitions to more desirable trade policies. Hopefully our new research projects will derive lessons on how to promote marketing of manufactures. Insight in this general area has been one of our aims all along, but WDR work gives us new perspectives and new readerships.

--A subject of enormous international interest, where our past work and WDR I presage much more in future, is the future progress to be expected from developing countries in their manufactured exports. Here, for example, there is much concern over how rapidly the leading developing countries (and others after them) will be able to diversify into capital

goods and other skill-intensive industrial products. There is also a need to look more carefully at the prospects of the less developed among the developing countries, and to call attention to the manufactured (and total) export picture in those that are not "newly industrialized countries." Then there is a need to look further at the total dimensions of the world market for the industrial products (and the whole set of products) in which developing countries are now or are likely to be most successful, relating this to the dimensions of their export needs. It would also be useful to project, 10, 15 and 20 years ahead, what the "newly industrialized countries" will be like, to see to what extent their wages and export needs will be a disruptive force. All of this would be a continuation of the work we (and others in the Bank) are already doing, in response to a strong need for such work to meet the needs of Bank operations and developing countries. But the new twist here is that governments and businesses in developed countries are intensely interested in what we learn.

--The other side of the same exports is what happens in the developed countries. Here the big new Baldwin and Waelbroeck research projects promise to give us a good deal of information. However, no matter how well they answer our questions and meet the need as research, there will surely be a demand to carry the analysis further and to convert their findings into policy papers.

--WDR I has also put us in the business of commenting on adjustment issues and policies in the developed countries. Here Martin Wolf will do a major paper as background for WDR II. This is likely to trigger a demand for further analysis, including work on the benefits from adjustment.

--In addition and as a complement to all these studies relating to manufactured exports, work is badly needed on imports of manufactures by developing countries--what they are, where they go, who supplies them, and their relationship to exports--and their implications for the policies of developed countries as well as developing ones. EPD is studying the links on a broad modeling level but there may be a need for policy purposes to indicate the industries and countries and the links to exports at a more detailed level.

10. I have purposely left out of this list trade-related issues where EPD would clearly have the main responsibility, for example, those involving primary exports, export processing, global modeling and interdependence, trends in total exports, price projections, and trends in protection. The subjects I list have all been treated so far, if at all, by the Development Economics Department together with other Bank units, cooperating on an informal or ad hoc basis.

11. How much we can do, if anything, to expand our work program and that of DPS as a whole in these areas obviously depends on questions of staffing. With our present staffing, it is doubtful that we will be able to maintain even a minimum program on manufactured exports, along the lines intended up to now. The operational support and reporting part of this program has practically ceased for the time being to make way for WDR II, and the research has been disrupted. It is also not at all clear that we can meet the minimum needs of WDR work no matter how much we cut back the rest of our program. For example, it is completely unclear who in the Bank will be available to do the WDR Core Group trade work, or the support work, for WDR III. On balance, compared to a year ago, the Bank now has fewer senior people in trade, and, of course, the Development Economics Department has also been weakened in this area.

12. Senior people in the trade and development field, in the Bank as a whole, are the key resources which is critically short, though, of course, it also matters greatly how these people are organized and what they are asked to do. Experience up to now in our trade work shows that particularly in regard to policy issues, but also in regard to analytical studies using non-standard methods or much judgment, good work in this field depends on senior people, who must have wide experience in trade and development issues, along with exceptional abilities. Junior, inexperienced or weak people are practically useless. Indeed, if there is a need to supervise them carefully, their net contribution can easily be negative. Use of senior consultants or else research assistants is likely to yield better results. The subject matter is too complex, with too many sides to it, to entrust the work to anyone who falls short of a very high standard. Other international organizations which do not have enough people of the highest quality do dull, useless, and often misleading studies. Unless we are staffed to do the job right, we shall do the same.

13. In my estimation, whatever success we have had up to now in the analysis of manufactured exports and surrounding issues of trade policy, has been made possible by bringing together within the Bank several top quality trade experts, whose exchanges of ideas have led some of us--certainly they have led me--to do much better work than we would otherwise have done. These people are almost all in different units and have always been few in number, but by comparison with other international organizations and research centers we have been exceedingly rich in first-rate people working together.

14. To expand the Bank's work program in this area seems to be feasible, with potentially excellent results, but it can only be done by bringing in several first-rate senior people and putting them to work on these issues. This appears practically impossible within the Development Policy Staff, let alone the Development Economics Department, under present staffing constraints, for two reasons. One is the nationality constraint interacting with an inability to attract suitable senior people apart from U.S. nationals. In the world as a whole, there are

only a few dozen people of sufficient quality and experience to help, and the non-U.S. nationals are all tied up in prestigious or powerful positions from which we generally cannot budge them for positions at less than an N level, and lately not even at that level. Thus the added senior people would have to be almost all U.S. nationals, though one or two could be drawn potentially from existing Bank staff now working mainly in other areas. Second, as a rule, the DPS does not have senior-level positions (for example at the M level), to offer these people.

15. In view of these staffing constraints, I recommend that we tell Bank management that this possibility exists, and that we would like to do the job but we can't get the people to do it unless they change the rules. Specifically, I recommend that the two Departments most concerned be given the authorization to recruit one U.S. national each at the M level this year, into what would otherwise be a slot at the L level. Within the next year every effort would be made to bring in two more senior people, one per department, perhaps by switching people from other tasks within the Bank. These people would be given research assistants and, eventually, one or two junior people to supervise, and together with everyone concerned in the Bank's management, we would work out a division of labor and work program based on a high degree of cooperation and frequent exchanges of ideas.

16. Bank management needs to be clearly told, in making its decisions, that if we do not get at least one or two more senior people, we shall have to curtail either our regular trade work or our WDR trade work, at least in the Development Economics Department, and probably in the Bank as a whole. If we are to expand our program in the directions suggested above, to meet the hopes raised by WDR, we are going to need four or five more senior people in this field. If the decision is made clearly on this basis, and our workload and expectations are adjusted accordingly, I shall be pleased no matter which way the decision goes.

cc: Messrs. Chenery, Karaosmanoglu, Balassa, Streeten, Acharya, Westphal, Colaco and Mrs. Hughes.

DBK:nb

THE WORLD BANK

ENERGY, WATER AND TELECOMMUNICATIONS DEPARTMENT

PUBLIC UTILITIES NOTES

RESEARCH IN ENERGY, WATER

AND TELECOMMUNICATIONS, 1972-78

October 1978

Central Projects Staff
Energy, Water and Telecommunications Department

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RESEARCH IN ENERGY, WATER
AND TELECOMMUNICATIONS, 1972-78

ABSTRACT

This is a briefing paper for the External Panel which is to review and evaluate the Bank's research in energy, water and telecommunications. The objectives and nature of the research program carried out in these sectors since 1972 are described, with particular emphasis on the interrelationships between research activities and Bank operations. Research results in terms of both dissemination and impact are discussed. The paper concludes with ideas for future research topics which will enable the Department to enhance and expand its contribution to the Bank's overall lending objectives during the next five years. The paper is issued as a Public Utility Note in connection with the Panel's first meetings, October 17-19, 1978, to serve as background material to all those who may be interviewed by the Panel or are concerned with these research activities. It is hoped that it will help stimulate comments and ideas concerning future research activities in energy, water and telecommunications.

Prepared by: Energy, Water and Telecommunications
Department Staff

October 1978

I. INTRODUCTION

The World Bank conducts research in order to further its understanding of the development process. Research serves as a basis of support for the many aspects of Bank operations; its results are used in formulating Bank lending policies and strategies and in providing advice to borrowers both on broad development or macroeconomic issues, and on sector policies and operations.

This note describes the research program that has been carried out in energy, water and telecommunications (EWT) since 1972. The program is discussed in relation both to the overall research program of the Bank and to the role of these sectors in Bank lending operations.

The Bank's research program is reviewed annually by the Joint Audit Committee of the Board of Directors and by the Board itself.^{1/} In assessing the effectiveness of the research effort, the Board has invariably expressed concern over the following issues:

- (a) optimum size of the research program;
- (b) overall direction and consistency;
- (c) balance between theoretical or broad development issues and practical or sectoral issues;
- (d) operational relevance;
- (e) efficiency and quality; and
- (f) dissemination of results inside the Bank and outside, and assimilation of results by developing countries.

The proposal that the Bank's research program should be subjected to the review of external panels was also made at the Board: the reviews are being

^{1/} See, for example, World Bank Research Program, World Bank, January 1978.

conducted on a sector-by-sector basis, with energy, water and telecommunications being treated together. Terms of reference for the EWT Research Panel are presented in Annex 1.

The amount spent by the Bank on research in FY77 was just over \$9 million, representing about four percent of its total administrative budget.^{1/} Most of the research expenditure is administered by a Research Committee, which is composed of representatives from throughout the Bank. The research projects are proposed to the Research Committee, and eventually carried out, by the Bank departments responsible for the policy activities to be supported by the research. They are principally the departments of the Development Policy Staff (DPS) and the sector departments of the Central Projects Staff (CPS). These departments also conduct, out of their own budgets, research activities which are too small or too applied to qualify for Research Committee financing. This accounts for about 20 percent of total research expenditure. The remaining activities include research identification and preparation and other small studies.^{2/} The EWT Department is responsible for research in the corresponding sectors.

The overall emphasis given to research in the EWT sectors should be seen in light of the importance of these sectors in the Bank's overall lending program. Thus, as Table 1 indicates, approved loans and credits for EWT projects during FY74-78 comprised over 20 percent of total approved Bank loans and credits during those years. They also accounted for about 16 percent of the total number of approved projects. In contrast, EWT research expenditure amounted to only about five percent of total Bank research expenditure over the same

^{1/} The total administrative budget of the Bank for FY77 is summarized in Annex 2.

^{2/} In addition, research may be carried out by borrowers in the context of specific development projects with the Bank providing a small part of project financing, e.g., the telecommunications project in Papua New Guinea.

period. It should be noted that these and subsequent data in this paper tend to underestimate the importance of the sectors, in that urban, rural development and tourism projects frequently have substantial power, water or telecommunications elements. Also, water supply and sanitation, on the one hand, and oil and gas on the other hand, are rapidly increasing activities--due in part to past or ongoing research--and will assume a significantly larger share of Bank Group lending in coming years.

Table 1: LOANS AND CREDITS, FY74-78

	<u>Loans</u> (\$ million)	<u>Credits</u> (\$ million)	<u>Total</u> (\$ million)	<u>% of Bank/</u> IDA Total	<u>No. of</u> Projects
Water Supply and Sanitation	1,131.6	197.7	1,329.3	4.1	58
Telecommunications	515.1	217.1	732.2	2.3	26
Power	3,606.4	713.7	4,320.1	13.4	84
Oil and Gas	199.0	-	199.0	0.6	4
<u>Total EWT</u>	<u>5,452.1</u>	<u>1,128.5</u>	<u>6,580.6</u>	<u>20.4</u>	<u>172</u>
<u>Total Bank/IDA</u>	<u>24,372.2</u>	<u>7,947.2</u>	<u>32,319.4</u>		<u>1,042</u>

In reviewing the EWT research program, it is useful to understand the role that the EWT Department plays within the Bank organization.^{1/} As a part of the Bank's Central Projects Staff, the Department's guiding responsibilities are for maintaining consistency and improving the quality of the Bank's lending and related operations. These objectives are pursued by the Department, and similarly by other CPS departments, through three main areas of activity. First, the Department provides continuous advice and assistance to the regions in their operational work. This involves both the review and the discussion of operational documents, the latter sometimes formalized in "decision meetings" with the regional personnel who are responsible for planning and executing IBRD/IDA

^{1/} An organization chart of the Bank is shown in Annex 3.

development assistance programs. Secondly, the EWT Department evaluates and develops policies, standards, and guidelines to meet the changing needs of the Bank's global concerns. These activities are pursued by exploring innovative techniques, developing and applying new approaches, and by providing professional leadership and contributing to professional staff development. Thirdly, the Department is specifically responsible for guiding and carrying out lending operations in telecommunications and petroleum. Annex 4 presents a breakdown of EWT advisory staff time by research and other activities

The number of professional staff employed in energy, water and telecommunications is 160, of whom 121 are employed in the regional offices, and 39 in the EWT Department. Of the EWT Department staff, 15 are advisory staff and 24 are operational staff of the divisions responsible for telecommunications and petroleum project lending. The Department has no separate research staff. The two staff allocated for research in 1972 were promptly integrated in the advisory staff. The research function is administered by the sector advisors, supported by the Economic Advisor, and is carried out by a multidisciplinary staff. Permanent staff time devoted to research has ranged between one and one and one-half manyears in the past. This does not include the subsequent policy, guidelines, and field demonstration work generated by the research. There are 15 economists in the sector. Six are in the advisory unit of the EWT Department. The other nine are in the 11 operational divisions of the regions and EWT Department. ^{1/}

II. FINANCING OF EWT RESEARCH

In FY77, \$743,000 was spent on research in EWT. This amount represents about ten percent of total research expenditure in the Bank for that year. This

^{1/} Compared with other major sectors, economists appear to be underrepresented in EWT, as Annex 5 indicates.

is shown in Table 2, which lists the resources devoted to research by major functional category for FY77.

As Table 2 indicates, about 80 percent of the Bank's research consists of projects approved by the Research Committee, which itself funds "external" expenditures (consultants, travel and data processing). It should be noted that the distinction between Research Committee and departmentally-financed projects is more than just of an accounting nature. In the EWT sector, the applied

Table 2: FY77 RESOURCES DEVOTED TO RESEARCH: PROFILE BY FUNCTIONAL CATEGORY

Category	Research Committee-approved Projects			Departmental Studies		
	Manpower ^{1/} Man- years	\$000s	Other Expend- iture \$000s	Total Cost \$000s	Man- years	\$000s
Income distribution	3.8	296	118.7	414.7	0.7	64
Growth/country economic analysis	4.0	346	367.8	713.8	0.7	70
International finance and trade	3.9	324	172.0	496.0	1.0	52
Agriculture and rural development	10.6	946	503.9	1,449.9	1.5	138
Industry	12.8	848	99.3	947.3	3.8	350
Transportation	3.5	350	248.0	598.0	0.5	50
Energy, water and telecommunications	3.1	310	232.7	542.7	2.0	200
Urbanization	4.4	374	65.1	439.1	1.7	104
Education	0.5	32	51.4	83.4	0.3	30
Labor and employment	2.6	212	69.9	281.9	1.5	114
Population, nutri- tion and health	1.6	154	91.0	245.0	2.3	234
Tourism	-	-	-	-	1.5	150
Other	-	-	19.4	19.4	-	-
Total	50.8	4,192	2,039.2	6,231.2	17.5	1,556

^{1/} Manpower includes both staff and consultant time. Professional time is costed at \$100,000 per manyear. Research assistant time is costed at \$40,000 per manyear.

nature of much of the work has frequently made departmental funding more appropriate. This is not only because of the essential overlap between the research efforts and operational activities, but also because the relatively small case studies--which can be absorbed within department budgets and which have some urgency in terms of applications and dissemination--are sometimes inappropriate to submit to the comprehensive review process required by the Research Committee. While the EWT Department has engaged in a number of projects that have been financed by the Research Committee, and which in terms of manpower and external expenditure have accounted for the bulk of the expenditures on research in the sectors, departmental resources have been used to support its projects in each case. Moreover, a number of projects that have been financed by the Department have also been closely related and have contributed to Research Committee-financed projects. For these reasons, in describing the content of the EWT research program, it is more convenient to distinguish between research projects on the basis of total expenditures rather than the source of funds. A distinction, therefore, is made between major and minor research projects, the former being those involving total costs (including staff time) of more than \$50,000. A comprehensive list of EWT projects, showing estimates of expenditure of staff time, is presented in Annex 6.

III. OBJECTIVES AND SCOPE OF THE EWT RESEARCH PROGRAM

The purpose of our research in EWT is, in general, to bring about an improvement in investment decisions in these sectors, and specifically, to improve the development impact of Bank lending. Research has, therefore, been addressed both to the benefit and cost sides of the investment decision; and has been broadly defined to reflect changing perceptions of development goals,

including specific social objectives such as income redistribution and the provision of basic needs to the rural and urban poor. This has involved considerable analysis of pricing policies, service standards, and the use of appropriate technologies as well as the development of new areas for lending.^{1/}

Research in most cases is highly operational, involving either fact-finding or the application of established theories to a developing country context with an emphasis on learning how to adapt Bank (and country) policies to rapidly changing exogenous events. The research relies heavily on case studies in which the normal spheres of research and operations often become indistinguishable. For example, some of the power pricing case studies which have been categorized as research have been paralleled by water pricing case studies which have been conducted as part of operational support or advisory work. Also of direct operational significance is the research associated with the effects of the 1973 oil price increase, which has resulted in a definition of Bank lending policy in this area.

An outline of the major elements of the research program since 1972 is presented below under the general sector headings of water supply and wastes, telecommunications, power, and energy.^{2/} Some overlap is clearly involved; similar approaches have been taken to the solution of problems in the various sectors, and some economies of scale have thus been achieved. For example, the pricing principles that have evolved in both the power and water supply fields have much in common, as have some of the conclusions regarding the evaluation of rural water, power, energy, and telecommunications projects.

^{1/} The tables in Annex 7 provide detailed classifications of EWT research projects by subject and type, research field, functional category, and impact and dissemination.

^{2/} More detailed descriptions of individual research projects are contained in Annex 8.

Water Supply and Wastes

Research in water supply and wastes has been dominated by projects that have as their primary focus the problems of supplying basic services to the poorest elements of society. For example, a study of the issues in village water supply was the result of increasing Bank concern that the benefits of economic growth failed to reach the rural masses who, in general, are much poorer than those living in urban areas. This study surveys existing practices in the provision of village water supplies and recommends the strategies to be taken if improvement in the supply of services to rural areas is to be achieved.

One of the major issues in the village water supply study is concerned with the appropriateness and practicality of attempting to estimate directly the benefits of village water supply projects as part of project analysis. Although there are believed to be important benefits derived from such projects, primarily with regard to public health, these benefits are extremely difficult to quantify in a way that provides meaningful information. A small research project culminating in the meeting of an advisory panel, in fact determined that it would not be appropriate to quantify these benefits on a routine basis.

While the size of and linkages between the benefits of water supply and sanitation projects remain largely qualitative, the role of pricing and investment policy in avoiding the wasteful use of resources and at the same time in encouraging the provision of basic needs to the poor, is clearly established. The practical aspects of pricing and investment policy have been developed through a mixture of research projects, including the village water supply study and part of a general project on pricing and investment in public utilities, as well as through a variety of case studies conducted as part of the operational work.

In addition to the benefit side of project evaluation, Department research has, of course, addressed many other parts of the problem of supplying basic needs to the poor. Research in water and wastes, particularly in the latter half of the period under consideration, has emphasized the analysis of appropriate technologies, alternative service standards, and cost-saving services. For example, by far the largest and most ambitious element of the research program in this sector is the project, which has just been completed, to identify appropriate technology for water supply and waste disposal. The emphasis of the study is on waste disposal, in view of the fact that the conventional means for the disposal of wastewater and excreta (i.e., by waterborne sewerage systems) are far too costly for most developing countries.

Related to the study on technology choice is another study which examines the potential cost savings to be derived from variations in or staging of water supply service standards; for example, the use of public standposts rather than--or as an intermediate step towards--house connections. This study involves an interesting blend of theory and applied analysis. Other significant projects in the area of water supply and wastes include highly applied work such as the development of an improved water hand pump for use in the rural areas of developing countries, the testing of wood bearings for hand pumps, and a study of means for reducing wastage from public hydrants.

Telecommunications

There has only been one major research project in the telecommunications field. Originally conceived as an empirical analysis of the costs and benefits of the rural telephone system in Costa Rica, the study has been changed in scope to incorporate a wider growing concern for the role of economics in the

telecommunications sector. Operational requirements delayed work on the project for about two years, but the lessons and experience gained because of the involvement of research staff in Bank operations have been incorporated into the analysis. The study focuses primarily upon telephone systems and concentrates on the problems of pricing and investment policy. The appropriate response to unsatisfied demand and system congestion where market distortions, low and inequitably distributed incomes, and extreme shortages of public funds constrain economic alternatives is an important challenge to the project analyst.

In part stimulated by the early experience with the Costa Rica study, a number of efforts have been made to encourage telecommunications borrowers to conduct economic and social research. The only expenditure of Bank funds in this area thus far has been on a study of telecommunications usage in Papua New Guinea. The Bank both prepared the terms of reference for this study and provided advice as required.

Power

Research in electric power, similar to that in the water supply and telecommunications sectors, has been primarily concerned during this period with supplying the poor in rural areas. One result of the major research project--that on village electrification--was the development of a general approach to the issue of supplying low income groups with basic services, whether in urban or rural areas. The village electrification project was based on an empirical study of the village electrification project in El Salvador. Attempts were made to measure project benefits; and recommendations were made about project evaluation procedures, pricing, and institutional and technical approaches appropriate not only for the El Salvador situation but also as applicable in the general context of development in the sector.

Another major study was that of pricing and investment in electricity supply. This project, which included both the development of theory and a number of case studies, was particularly valuable in demonstrating how marginal cost pricing could be applied in practice to the electric power sector in developing countries. A method of calculating marginal cost was devised, and the various adjustments necessary to translate this into a workable tariff were presented, in light of the numerous objectives and constraints faced by the power tariff analyst.

As in the water supply sector, power systems in developing countries tend to follow standards that have been established in industrialized countries, which are sometimes unjustifiable or inappropriate depending on the context. It appears that the greatest scope for cost savings lies in a reduction of reliability standards. Thus, following a study of the alternative means of providing a given standard of reliability, a large exercise has been conducted in which the costs and benefits of alternative standards of reliability of urban distribution systems have been analyzed. This study, which is a unique combination of engineering and economic analysis, both develops a theory of optimal standards and applies the methodology to a city in Brazil.

Energy

Research in energy, as distinct from electric power, has tended to address somewhat broader issues than has that in power and water supply. This is mainly because lending for energy is a new field for the Bank, and a number of projects of an exploratory nature have been required to establish general Bank policy in this area. Examples of research that has focused on very broad issues include the assessment of the petroleum prospects of developing countries, and a study which reviews the state of knowledge about coal resources, production,

consumption, and trade. The global supply and demand outlook for energy has also been the subject of a research project.

The problems of forecasting demand are difficult and especially complex in developing countries because of a history of supply constraints (which makes the evidence of past trends unreliable) and the predominance of non-commercial energy resources about which information is very scarce. Demand issues have been addressed in two research projects, one which is almost entirely concerned with the problems of prediction, and the other which also makes some normative judgments about the estimates of basic energy needs.

The plight of the rural poor has also received a relatively large amount of attention in the energy sector research program. As examples, one study presents an approach to planning and implementing rural energy projects, using Colombia as a case study, while others examine the potential of non-conventional energy sources in India and northeast Brazil.

IV. THE RESULTS OF RESEARCH: DISSEMINATION AND IMPACT

Dissemination of research findings to Bank staff and borrowers has been an integral part of the research program. Inside the Bank, regional staff are involved in the conception and formulation of research projects and are kept informed of progress and results through the "bag lunch" series, seminars at staff meetings, and workshops, as well as through informal contacts. A departmental documents series was created in 1973 to allow early publication of research results and to provide an information retrieval service for innovative operational work on such topics as pricing and pollution control. This series includes research papers, which describe in detail the research projects; public

utility notes, which present case studies or examples of research applications; and guidelines, which are directly aimed at incorporating research findings into Bank work. Other means of dissemination include books and policy papers published by the Bank. A bibliography of Department publications appears as Annex 9.

In parallel with the publication process, efforts to integrate research findings into routine Bank work are made through the Department's function of reviewing operational papers, its demonstration of methodologies through case studies, and the participation of EWT Department staff in field work.

In addition to the work done to disseminate results internally and to involve operational staff through the entire research process, a number of new dimensions have been built into external dissemination in recent years. These include the integration of economic analysis and research into the planning process of borrowing entities, the dissemination of research findings through the training and use of developing country consultants, and the use of the UNDP to fund the design and construction of pilot projects as a follow-up to the research program.

Outside the Bank, developing country colleagues are the main dissemination target. Numerous seminars have been held on pricing policies (e.g., in India, Malaysia, Thailand, the Philippines), rural electrification (e.g., in Central America, West Africa), and appropriate technology (e.g., in Indonesia, the Philippines, Sudan). In addition, contacts with academic and professional organizations are maintained through the presenting of papers and seminars at such organizations as the American Society of Civil Engineers, the Western Economics Association, the International Telecommunication Union, the American Water Works Association, the National Academy of Sciences, the World Health Organization, the International Courses in Hydraulic and Sanitary Engineering,

and the Institution of Electrical Engineers. Expanded case studies on topics such as power reliability standards and telecommunications costs and benefits have been carried out in close cooperation with borrower agencies. In some cases, economic research units have been established in the utilities themselves (e.g., telecommunications in India, electric power in Thailand and the Philippines), to develop the in-house expertise to carry out tariff studies and other analyses formerly requiring external consultants.

The training aspects of such dissemination in developing countries require considerable staff time and effort. For the most part they cannot be entrusted to consultants even if the research itself can be. In the case of the research project in appropriate technology for water supply and waste disposal, an effort was made to incorporate dissemination aspects into the research by hiring local consultants to undertake the case studies in 11 of the countries. However, early experience indicated the need for both detailed briefing sessions and mid-term review meetings to ensure high quality output, adding a considerable amount of professional staff time to the project.

The costs of dissemination rise rapidly when research results are transferred from inside the Bank to borrowers, the consulting profession, and others. These costs--of seminars, workshops, field demonstrations--have to be weighed against the benefits foregone by delaying implementation. Paralleling the effort to broaden the scope of dissemination is a concern for its timeliness. With important research results, any loss of time in implementation, e.g., of efficiency or social pricing or lower cost technology, is counterproductive to development objectives and the large investments at stake. Assimilation of the work on pricing and investment planning, for example, can provide a developing country with the economic rationale it needs to make investment choices. Once appropriate technologies are identified to provide basic services, that

information must be shared with local design staff and planning officials before new contracts are signed to build costly, conventional systems. For this reason in-house publications (e.g., the public utility note series, issues papers) are generally issued before the completion of research projects, and seminars and workshops are held to disseminate early results. In the advisory staff review of CPPs, project briefs, and other operational documents, projects are often identified for the implementation of research results. The operational staff provide a key link to timely dissemination.

Major recent projects of the Department are discussed below with respect to the ways in which they have impacted development policies and planning.

Village Water Supply and Village Electrification Projects

These two projects were initiated at a time when both sectors were new areas for Bank lending. Both research efforts culminated in policy papers, which have since been used to guide Bank staff in the appraisal of such projects. The research also led to the development of sector pricing strategies which emphasize both the need to avoid wasteful use by larger consumers and the importance of providing basic supplies to lower income groups. The appropriate tariff structure-- typically a "lifeline" rate plus a higher charge for larger volumes of consumption, with the financial surpluses that normally result used to extend supplies to those currently unserved--has become a cornerstone of Bank policy towards the provision of basic needs not only to the rural but also the urban poor. A history of the village electrification project is outlined in Annex 10; an indication of the impact on Bank policy of this project is that each rural electrification project approved by the Board in FY78 made specific reference to the Issues Paper that resulted from the research, and relied upon it particularly with regard to economic and financial aspects.

Pricing and Investment in Power and Water Supply

The role of marginal cost in the pricing of public services has received considerable attention in the research program. Originally dominated entirely by financial and technical criteria, pricing and investment policy as advocated by the Bank now contains a strong element of economics, with increasing attention being paid to tariff structures, economic efficiency and the use of pricing to achieve and evaluate a range of economic and social objectives. This is illustrated by a survey of the power appraisal reports for FY73 and FY78. In the former year, of the ten power projects approved by the Board, only four made any reference to marginal cost pricing, three of these containing a substantial discussion of the role of tariff level and structure in influencing consumer behavior, with two critically evaluating existing pricing policy in these terms. In contrast, all of the 18 reports for FY78 discussed the role of price in influencing consumption and critically evaluated tariff levels and/or structures in terms of their resource allocation implications. Moreover, while in FY73 one report referred to an ongoing tariff study based on marginal cost pricing principles, in FY78, 15 either referred to such studies or recommended or required the borrower to conduct them. One tangible result of our institution-building efforts in this area has been that an increasing number of borrowers are, with Bank guidance, conducting their own tariff studies rather than, as hitherto, simply relying upon foreign consultants to do this work for them. Similar patterns are observed in the case of water supply and telecommunications. The contrast between FY73 and FY78 is less dramatic in these cases however: water supply had an earlier start in the application of economic pricing theory, and telecommunications, due to the greater theoretical and empirical complexities involved, has in this respect lagged somewhat behind the other sectors.

Oil and Gas Potential of Oil-Importing Developing Countries

This project, stimulated by the 1973 oil price increases, has formed the basis for a major part of a Bank policy paper on minerals and energy in developing countries. By demonstrating the oil and gas potential of oil-importing developing countries, and identifying constraints to development, the project has helped to define a role the World Bank can plan in financing petroleum projects. The direct impact of this project on Bank operations can be readily identifiable with the emergence of a new and increasingly significant sector lending program.

V. FUTURE RESEARCH

Dissemination of recently completed research will command priority in the use of the limited staff resources likely to be available. The current panel review constitutes, however, a unique opportunity to size up anew the need for continued research activities: to identify new areas and types of projects for Bank lending, such as postal services, rural energy, and the various projects designed to alleviate absolute poverty, or to find new means of broadening the impact of our projects to deal with health, nutrition, family planning, and urban and rural development, and, in general, to make the execution of such projects, which are inherently complex, more effective.

The main elements of a possible research program for EWT during the next five years are outlined below, by sector. This first tentative program is deliberately over-ambitious to ensure that thinking about the future is not inhibited by the current excessive budget constraint. Thus the average annual time proposed for research over the period FY80-84 is about six times the amount of staff and consultant time devoted to research in FY77. The guidance and

recommendations of the panel are sought regarding the scope and direction of a future research program, with attention not only to the inherent merits of the proposed research topics, but also to the comparative advantage of the World Bank in conducting the research.

A. Water Supply and Wastes

The Bank's lending program currently being formulated for the water and wastes sector during the next five years projects that in real terms, lending will more than triple in size. Much of this growth will be in the form of "new style" or poverty-related projects, whose proportion in the lending program is expected to grow from 47 percent in FY78 to about 75 percent in FY83. During the five-year period as much as 30 percent of the sectoral lending program will go to rural areas. Much of the sector's past and present research has been directed towards preparing for these large increases in new-style projects.

The development of appropriate institutional structures to facilitate community participation and the implementation of appropriate technologies have proven to be the two most critical constraints on the expansion and success of poverty-related projects. The Bank has had much experience with institution building in the sector. A worthy research project would be a comprehensive analysis and synthesis of that experience in order to derive guidelines and policies for institutional development, for example, in the areas of financial performance and the control of unaccounted for water. The feasibility of developing programs for linking the provision of water supply and sanitation to family planning, nutrition, and health education would also be tested. As an additional institution-building component, new avenues would be explored for providing on-the-job training through exchange programs with the staff of utilities

in developed countries. In total, over the next five years, these tasks might absorb six manyears of staff and consultant time.

In the area of appropriate technology, much research and development work has already been done in the Department including the largest research project to date on water supply and waste disposal which has just been completed. Most of the future research program in this area would thus be directed towards the dissemination and implementation of research results. This area of the research program over the next five years might include four parts: dissemination of results through papers, lectures, seminars and workshops (18 manyears); the management of a UNDP-funded program of prototype projects (6 manyears); and design assistance to regional staff in implementing low-cost technologies in Bank projects (13 manyears).

The third main area of research--resource recovery from waste--would initiate a multidisciplinary and integrated approach to waste treatment, disposal and reuse. There is sufficient evidence to indicate that a comprehensive approach to waste disposal and resource recovery can provide economic and financial benefits which the single project approach has failed to generate. Appropriate technology research projects previously have investigated single aspects of the waste problem such as composting of garbage, aquaculture with treated sewage, and biogas from human and animal excreta, but few of these schemes have been successfully implemented. This research 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 (10 manyears).

B. Telecommunications

Investment in the telecommunications sector during the forthcoming decade should rise rapidly as LDCs become increasingly aware of the vital role played by telecommunications in the development process, this being facilitated by the high rate of technological advance and economies of scale in the industry. The Bank has an important role to play in mobilizing resources to help eliminate congestion of telephone networks, reducing the massive waiting lists for service, and helping focus priorities on the numerous small towns and provincial areas currently without service; in addition it will continue to play an important institution-building role in the technical and financial areas, and in particular, in ensuring that telecommunications policies are responsive to economic and social needs. This will require socioeconomic research of the kind in which the Bank is gaining experience and appears to have a comparative advantage. The two primary areas for future research are related to benefits and to appropriate technology.

On the benefit side, the research program would focus on studying such basic issues as the characteristics of existing telephone users, the purposes of telephone usage, and the ways in which changes in access to and quality of service can be made to interface with national or regional development goals. The productive linkages that telecommunications provide among other development programs (e.g., health clinics, nutrition improvement, transportation, agricultural extension) and priorities for telecommunications investments would also be explored, in order that more coherent communications programs can materialize. In addition, because the fiscal and other resource mobilization implications of telecommunications projects are not yet well understood, research would focus on such issues as when deviations from pricing according to the cost of service are

justified to promote a more efficient or equitable usage of or access to service, and under what conditions telecommunications tariffs should be used partly to generate funds for use in other sectors or to subsidize postal services (9 manyears).

The determination of appropriate technology for developing countries is a particularly challenging problem for telecommunications investments which are very capital intensive but which also offer significant economies of scale. Research in this area would relate to the national coordination of investment decisions, optimal investment strategy over time, incremental costs of residential telephones, problems of capital indivisibility, and the case for integrated telecommunications and postal projects in the overall communications sector of a developing country (6 manyears). The potential for Bank lending and institution building in postal communications would also be explored (1 manyear).

C. Energy

Electric Power - The power lending program, which has averaged around \$900 million per year over the past five years, is expected to increase to a level of about \$1.1 billion per year during the next five years. The increasing attention paid to rural electrification and distribution projects since 1975 is likely to be continued in the future. Suggested topics for future research would reflect both new and evolving priorities as anticipated in the lending program.

The earlier and more basic research on power pricing would be continued in the form of applied research work and case studies. In addition, several borrowers who have recently undertaken in-house power tariff studies, and others who have the capacity to do so with some external guidance and encouragement, have requested technical assistance and advice in tariff setting. It is believed

that a series of seminars would greatly assist those borrowers already carrying out pricing studies and would acquaint others with the basic concepts involved. Seminars also would help promote the formation of new tariff groups within the power utilities, thereby reducing reliance on foreign consultants. In general, such seminars, for the dissemination of results, would generally strengthen technical assistance and institution-building efforts in the sector. A pilot seminar emphasizing a "learning by doing" approach, was recently conducted by the Department in Bangkok (June 1978) and was well-received (5 manyears).

An interest in reliability standards for rural areas stems from both earlier work on the economics of optimum reliability levels in power system planning in the urban context, and case studies of rural electrification carried out in selected developing countries. Experience is showing that as the number of rural electrification projects grows, the diversity of outside consultants and design practices is also expanding. Thus, it will become increasingly important for the Bank to develop guidelines for standardizing such aspects as the types and uses of hardware and design criteria. The proposed research would involve a review of current practices in developing countries, followed by several detailed case studies. The previous work on the use of economic criteria in reliability level optimization would be the starting point for choosing appropriate designs for rural electrification networks (16 manyears).

Finally, a research project on auto-generation is planned, including case studies, to investigate the incidence, causes, and economic rationale for maintaining captive power plants. This study will be closely linked with the present research on inter-fuel pricing and energy sector economic analysis from an integrated viewpoint. Currently, new work on co-generation 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 research on auto-generation (5 manyears).

Oil and Gas - Although oil and gas is a new sector in the Bank lending program, having received its first loan in FY77, a very rapid buildup of lending is expected, to a level of about seven loans per year over the next two to three years. In addition, in support of integrated rural development projects and as a complement to village electrification, rural energy lending is expected to begin with two projects during the next year and increase as staff experience grows. There is also a possibility that the Bank will begin lending for petroleum exploration projects.

The research program over the next five years would examine the energy sector as a new area of involvement for the Bank (as well as a new productive sector for many developing countries) and thus in the light of the important country economic and sector work which must be carried out over the next few years. At the global level, the Bank's access to information gives it a comparative advantage in being able to provide a continuous updating of the world energy outlook with special emphasis on developing countries (10 manyears). In addition, research, involving case studies, would focus on the linkages between energy and economic development (7 manyears) and on energy sector planning methodologies (5 manyears). Specifically, an examination of the concept of "basic energy needs" and of the demand for and supply of energy to the rural and urban poor would have important implications for the formulation of Bank policy in the sector (20 manyears).

Applied research and dissemination work also need to be done on energy pricing (7 manyears) and on the technical and economic potential of non-conventional energy technologies (8 manyears). The market prospects and joint cost problems of natural gas which is now being flared is an intriguing, and potentially very important, area for research (3 manyears). A study of the issues involved in petroleum exploration would also become necessary if the Bank is to become more involved in this area (3 manyears).

D. Multisector Research

A number of multisector research projects have been suggested as part of the research program. The first would examine the potential role of public utilities as generators of public revenues at both the local and national level. In those projects where prices are set at long-run marginal cost (many water and power projects) or at levels to allocate scarcity efficiently (telecommunications), a financial surplus is often produced which could have significant fiscal and income-distributional consequences (4 manyears). Another suggested area for research involves the complex issues of asset revaluation as applied to utility enterprises. The alternative methods of revaluing assets (e.g., the Latin American indexing systems, replacement value practices in USA) would be studied to find suitable bases for the revaluation of assets of utilities in developing countries (2 manyears).

There are several other areas for research which would be applicable to all EWT sectors. The first involves consumer relations and possible studies of public education schemes. Particularly when price increases are required, consumers have resisted and the consequences have at times been violence or the failure to maintain the economic and financial viability of the enterprise concerned (1 manyear). The role of co-financing in helping to spread both the financial and institution lending contribution of the Bank Group in the EWT sectors also merits analysis (1 manyear).

Review of Research in Energy, Water and Telecommunications

Terms of Reference for Panel

A. Introduction

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:

- choice of research topics,
- the way in which the research has been conducted,
- operational relevance of the results,
- lessons for future research efforts.

B. Guidelines for Evaluation

The objectives of the Bank's Research Program 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 research program of the Energy, Water and Telecommunications Department 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 are suggested as an organizing format for the report on the panel'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 development issues?

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?

C. Composition of Panel

A high level review panel, with representatives from the academic world as well as from the utilities under consideration has been appointed. a listing of the five-person panel is as follows:

Mr. Boiteux (Chairman)	Director General Electricite de France
Prof. A. R. Prest	Chairman, Economics Dept. 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

D. Research Projects to be Considered

The major projects to be considered by the panel are as follows:

- Analysis of Problems and Issues in Village Electrification
- Pricing and Investment in Electricity Supply

- Village Water Supply
- Standards of Reliability of Urban Electricity Supply
- Pricing and Investment in Telecommunications
- Rural Water Supply
- Wastewater Reuse
- Appropriate Technology for Water Supply and Waste Disposal
- Oil and Gas Potential of Oil-Importing Developing Countries
- Design of Low Cost Water Distribution Systems

In addition, a number of smaller projects should also be considered. These include research on a variety of subjects, ranging from the development of a hand pump for rural areas of developing countries to an analysis of telecommunications usage in Papua New Guinea. Since the dividing line between the research work conducted in this sector and operational work, particularly in the economics area, is so blurred, the terms of reference of the panel should be defined to include consideration of the general development of economic analysis in the sector, and the way in which this has been reflected in operational work.

E. Schedule of Work

The panel will begin its work in October 1978. A tentative work program is as follows:

- | | |
|---------------|---|
| October 1978 | Panel spends 3 days in Washington, gathering documentation and talking to staff: division of labor among panel arranged. |
| February 1979 | Panel meets in Washington for one week, to discuss findings on individual projects: an approach to preparation of draft final report to be agreed. Future talks as necessary with Bank staff. |
| March 1979 | Submission of final report. |

IBRD/IDA FY77 PROGRAM NET COST SUMMARY (\$000)^{1/}

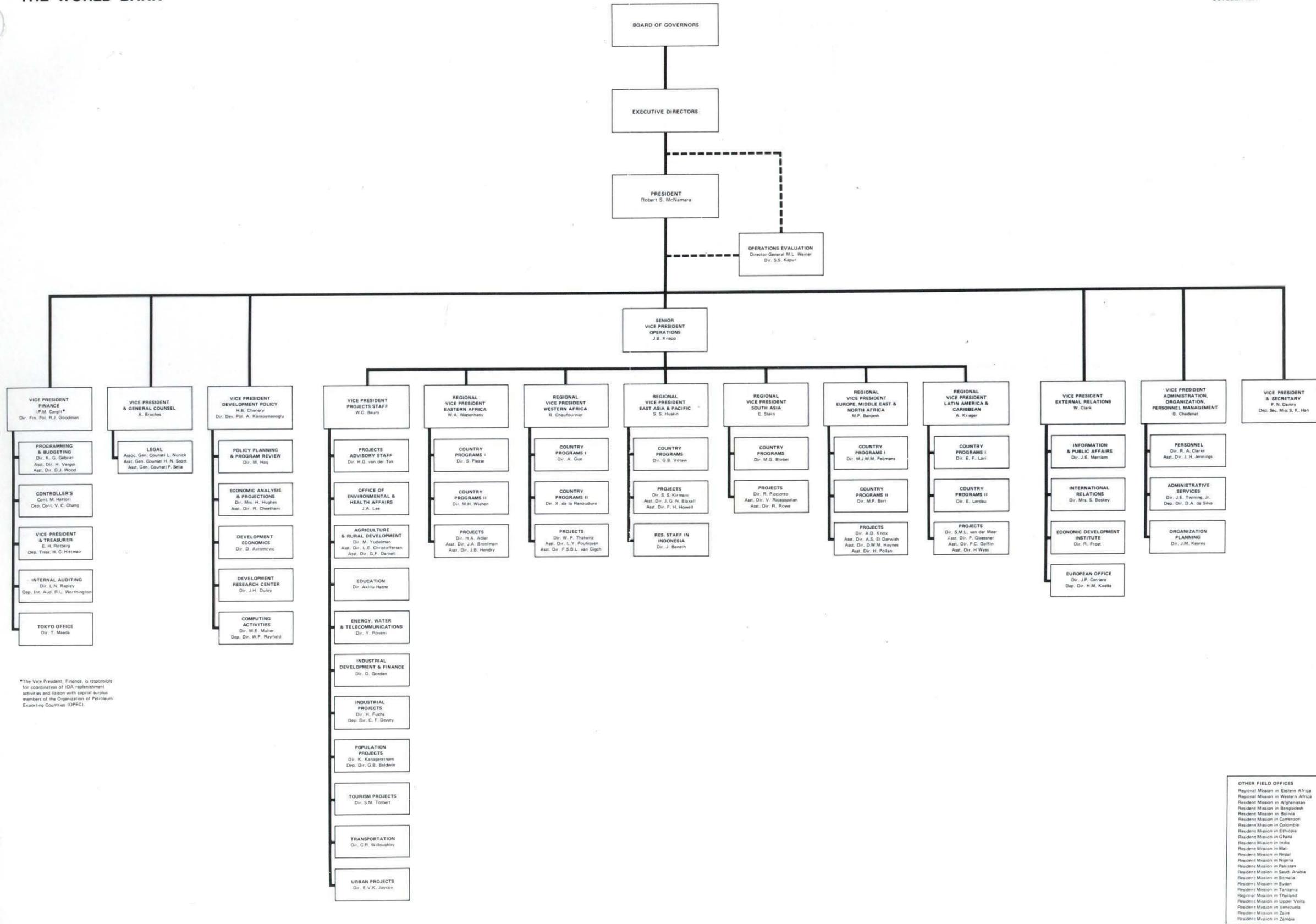
	Lending	Supervision	Economic and Sector Work	Operational Support and Advice	Policy and Guidelines ^{2/}	Research ^{3/}	Other ^{4/}	Subtotal Other Output	Total
Bd. of Govs., Dev. Comm., Exec. Directors	-	-	-	-	-	-	8,359	(8,359)	8,359
Exec. Offices, CAD, Secretaries, ASD, Personnel, Organization Planning	-	-	-	-	-	-	26,648	(26,648)	26,648
Office of the Senior Vice President	276	159	157	14	17	13	1	(45)	637
Eastern Africa	8,208	4,584	3,354	-	32	49	-	(81)	16,227
Western Africa	7,622	4,456	4,132	-	65	33	-	(98)	16,308
EMENA	7,652	4,864	4,958	-	107	18	18	(143)	17,617
LAC	8,464	4,977	4,960	-	-	56	-	(56)	18,457
EAP	6,352	4,671	3,595	-	30	15	15	(60)	14,678
South Asia	6,414	3,466	3,934	-	-	14	-	(14)	13,828
Regional Subtotal	(44,712)	(27,018)	(24,933)	-	(234)	(185)	(33)	(452)	(97,115)
CPS	10,623	4,925	2,142	2,605	2,837	2,321	26	(7,789)	25,479
DPS	137	62	1,764	1,628	4,343	4,312	-	(10,283)	12,246
External Research	-	-	-	-	-	2,035	-	(2,035)	2,035
Legal	-	-	-	-	-	-	3,500	(3,500)	3,500
ICSID, CGIAR, GGFPI, Grants for Consultants to Member Countries	-	-	-	-	-	-	1,027	(1,027)	1,027
Cooperative Programs	3,793	376	1,442	-	-	-	-	(-)	5,611
Financial Staff	-	-	-	-	-	-	13,977	(13,977)	13,977
Operations Evaluation	-	-	-	-	-	-	1,805	(1,805)	1,805
YPP and Special Recruitment	802	170	692	53	95	159	181	(488)	2,152
EDI	-	-	-	-	-	-	5,492	(5,492)	5,492
External Relations, European and Tokyo Offices	-	-	-	-	-	-	7,149	(7,149)	7,149
Net Total IBRD/IDA	<u>60,343</u>	<u>32,710</u>	<u>31,130</u>	<u>4,300</u>	<u>7,526</u>	<u>9,025</u>	<u>68,198</u>	<u>(89,049)</u>	<u>213,232</u>

1/ Data consolidated from P&B worksheets for FY78 Administrative Budget paper using FY77 current dollars.

2/ Includes policy papers, guidelines, analytical tools and data and monitoring systems.

3/ Includes joint and in-house.

4/ Includes special projects, operations evaluation, financial, legal, EDI and external relations activities, general support and activities of special units.



*The Vice President, Finance, is responsible for coordination of IDA replenishment activities and liaison with capital surplus members of the Organization of Petroleum Exporting Countries (OPEC).

- OTHER FIELD OFFICES**
- Regional Mission in Eastern Africa
 - Regional Mission in Western Africa
 - Resident Mission in Afghanistan
 - Resident Mission in Bangladesh
 - Resident Mission in Bolivia
 - Resident Mission in Cameroon
 - Resident Mission in Colombia
 - Resident Mission in El Salvador
 - Resident Mission in Ghana
 - Resident Mission in India
 - Resident Mission in Mali
 - Resident Mission in Nepal
 - Resident Mission in Nigeria
 - Resident Mission in Pakistan
 - Resident Mission in Saudi Arabia
 - Resident Mission in Somalia
 - Resident Mission in Sudan
 - Resident Mission in Tanzania
 - Regional Mission in Thailand
 - Resident Mission in Upper Volta
 - Resident Mission in Venezuela
 - Resident Mission in Zaire
 - Resident Mission in Zambia

Summary of EWT Advisory Staff Time^{1/} FY74-77
(Man-weeks)

	Direct Operational Support	Operational Support & Advice	Research	Policy	Guidelines	Data/Monitoring Systems & Analytical Tools	Aid Coordination and Conferences	Total Manpower	% ^{3/}
Power									
1974	.8	71.6	45	28.6	7.2	1.4	2.6	157.2	44
1975	6.2	67.7	27.2	2.7	1.5	7.0	.2	112.5	29
1976	12.9	78.2	4.1	.7	-	1.6	6.0	103.5	24
1977	19.5	80.9	25.8	-	-	-	2.6	128.8	21
Energy									
1974	-	9.2	4.5	18.5	3.4	-	3.1	38.7	11
1975	14.1	17.0	9	4.0	14.5	13.6	7.5	79.7	21
1976	25.4	21.5	6.7	6.4	8.5	24.4	7.2	100.1	23
1977	86.1	49.4	5.3	3.0	.6	6.4	6.1	156.9	26
Water									
1974	2.5	40.0	9.9	13.6	1.5	-	5.8	73.3	20
1975	12.7	82.6	22.5	7.9	.6	.2	13.1	139.6	36
1976	25.7	109.4	15.3	1.7	1.5	3.0	14.0	170.6	39
1977	42.5	118.9	49.1	1.3	9.6	-	14.6	236.0	39
Telecommunications									
1974	n.a.	16.3	35.9	3.1	.3	-	3.1	58.7	16
1975	n.a.	28.3	6.4	-	3.4	-	-	38.1	10
1976	n.a.	30.4	13.2	-	1.4	.5	1.5	47.0	11
1977	8.8	34.1	14.7	-	2.0	2.0	4.5	66.1	11
Multi-Sector (Economics and Finance)^{2/}									
1974	-	-	-	12.9	16.4	3.0	-	32.3	9
1975	-	-	-	2.9	6.9	4.6	-	14.4	4
1976	-	-	10.1	-	2.0	3.0	-	15.1	3
1977	-	-	1.4	1.1	8.0	1.4	-	11.9	2
Total									
1974	3.3	137.1	95.3	76.7	28.8	4.4	14.6	360.2	100
1975	33.0	195.6	65.1	17.5	26.9	25.4	20.8	384.3	100
1976	64.0	239.5	49.4	8.8	13.4	32.5	28.7	436.3	100
1977	156.9	283.3	96.3	5.4	20.2	9.8	27.8	599.7	100

^{1/} Time includes Advisory Staff only (YPs and consultants are not shown here).

^{2/} Economists and financial staff time for Direct Operational Support and operational support and advice has been allocated to each sector in proportion to lending and supervision activities in each year.

^{3/} Percentage of total manpower for each year.

World Bank Economists by Certain Major Sectors

	<u>Total Lending</u> [*]	<u>Total Staff</u>	<u>Total Economists (Grade J-M)</u>
Agriculture and Rural Development	3269.7	360	121
Education	351.9	93	19
Transportation	1092.9	147	56
EWT	1742.5	156	14

* Figures for FY78, total loans and credits in US\$
from World Bank Annual Report 1978, pg. 17.

Major and Minor EWT Research Projects, 1972-1978

1. Major Projects (i.e., those with total cost in excess of \$50,000)

Title	Year of Completion	Staff Manpower 1/ (Man-weeks)	(\$000)	Other Expendi- ture 2/ (\$000)	Total Cost (\$000)
Analysis of Problems and Issues in Village Electrification	1975	104.0	200.0	203.5	403.5
Pricing and Investment in Electricity Supply	1976	108.2	208.0	52.9	260.9
Village Water Supply	1975	18.0	34.6	35.0	69.6
Standards of Reliability of Urban Electricity Supply	1978	33.3	64.0	139.9	203.9
Pricing and Investment in Telecommunications	1978	35.0	67.3	46.9	114.2
Appropriate Technology for Water Supply and Waste Disposal	1978	49.1	94.4	580.5 ^{3/}	674.9
Oil and Gas Potential of Oil-Importing Developing Countries	1976	6.8	13.0	64.9 ^{4/}	91.5
Design of Low Cost Water Distribution Systems	1978	4.1	7.8	59.7	67.5
An Approach to Planning and Implementing Rural Energy Projects (Report on Pilot Exercise in Colombia)	1978	36.2	69.6	2.8	72.4
Economics of Telecommunications in Papua New Guinea	1978	20.4	39.2	15.0	54.2

2. Minor Projects (i.e., with total cost less than \$50,000)

Title	Year of Completion	Staff Manpower 1/ (Man-weeks)	(\$000)	Other Expendi- ture 2/ (\$000)	Total Cost (\$000)
(a) <u>Water Supply and Wastes</u>					
Rural Water Supply	1978	0.5	0.9	33.7	34.6
Wastewater Reuse (Agricultural and Industrial)	1978	3.2	6.1	38.0	44.1
Fabrication of PVC Well Screens	1978	.2	0.3	5.0	5.3
Pipelines	1978	.5	0.9	20.0	20.9
Reduction of Unaccounted for Water	1977	.7	1.3	18.8	20.1
Domestic Water Meters	1977	.7	1.3	5.1	6.4
Reduction in Waste Water from Public Hydrants	1977	1.6	3.0	27.9	30.9
Testing of Wood Bearings for Hand Pumps	1978	.2	0.3	2.8	3.1
Measurement of the Health Benefits of Investments in Water Supply	1976	4.5	8.6	15.1	23.7
A Hand Pump for Rural Areas of Developing Countries	1976	2.0	3.8	7.1	10.9

2. Minor Projects (continued)

Title	Year of Completion	Staff Manpower ^{1/} (Man-weeks) (\$000)		Other Expendi- ture ^{2/} (\$000)	Total Cost (\$000)
(b) <u>Power</u>					
Dominant Issues in Nuclear Safety	1974	1.0	1.9	1.3	3.2
Sectoral Adjustments to Higher Energy Costs - Power	1974	3.0	5.7	-	5.7
Public Utility Pricing and Investment (also Water Supply Element)	1977	9.3	17.8	28.6	46.4
Rural Electrification in Liberia	1977	10.0	19.2	24.5	43.7
(c) <u>Energy</u>					
Energy Demand Forecasting: A Critical Review of Current Approaches	1977	20.0	38.4	.6	39.0
Energy Supply Demand Outlook, 1980-1985	1974	4.0	7.6	-	7.6
Potential of Non-Conventional Energy Sources for Northeast Brazil and a Recommended Research and Development Program	1976	.2	.3	6.3	6.6
Use of Solar Water Heaters in India	1977	2.3	4.4	5.6	10.0
Energy for Development	1978	4.0	7.6	23.1	30.7

2. Minor Projects (continued)

Title	Year of Completion	<u>Staff Manpower</u> ^{1/} (Man-weeks) (\$000)		Other Expendi- ture ^{2/} (\$000)	Total Cost (\$000)
(c) <u>Energy</u> (continued)					
Coal: State of the Art	1974	2.2	4.2	13.7	17.9
An Assessment of the Petroleum Prospects of Certain Developing Nations	1974	.2	.3	3.6	3.9

^{1/} Due to the unavailability of complete data, total time is based on actual time for the period 7/1/75-12/31/77 and on estimates for all earlier years.

^{2/} Includes consultant fees, consultant travel, staff travel and, where appropriate, computer time. Expenditures prior to 1972 based on estimates.

^{3/} Includes expenditures through FY78 and \$23,000 expected expenditure for FY79.

^{4/} Contract shared with DPS; total expenditure of EWT \$40,000.

ANNEX 7

TABLE 1

EWT DEPARTMENT RESEARCH PROJECTS BY SUBJECT AND TYPE, 1972 - 1975

TITLE	PRICING	APPROPRIATE TECHNOLOGY	INVESTMENT CRITERIA	FORECASTING	POVERTY-RELATED	RURAL	URBAN	THEORETICAL	EMPIRICAL	ORIGINATOR ^{1/}	OTHERS INCLUDED		EXTERIOR TO BANK	BANK ^{3/}
											WITHIN BANK ^{2/}			
Analysis of Problems and Issues in Village Electrification	x		x	x	x	x		x	x	b		c	a,b,d	
Pricing and Investment in Electricity Supply	x		x					x	x	b		c	a,b,d	
Village Water Supply	x	x	x		x	x		x	x	b		c	a,b	
Standards of Reliability of Urban Electricity Supply		x	x		x		x	x	x	b		c	a,b	
Pricing and Investment in Telecommunications	x		x			x	x	x	x	b		c	a,b,d	
Appropriate Technology for Water Supply and Waste Disposal		x			x	x	x		x	b		a,c	a,d	
Oil and Gas Potential of Oil-Importing Developing Countries	x		x	x			x		x	b		c	a,d	
Design of Low Cost Water Distribution Systems		x	x		x				x	b			a	
An Approach to Planning and Implementing Rural Energy Projects (Report on Pilot Exercise in Colombia)		x	x		x	x				b			b	
Economics of Telecommunications in Papua New Guinea	x				x	x	x		x	b,c			a,b,d	
Rural Water Supply	x	x				x			x	b			a	
Wastewater Reuse (Agricultural and Industrial)		x				x	x		x	b			a,b	
Fabrication of PVC Well Screens		x				x			x	b		c	a,b	
Pipelines		x				x	x	x	x	b			a	
Reduction of Unaccounted for Water	x	x				x	x		x	b		c	a,b	
Domestic Water Meters	x	x				x	x		x	b			d	
Reduction in Waste Water from Public Hydrants		x				x	x		x	b			a	
Testing of Wood Bearings for Hand Pumps		x				x	x		x	b			a	
Measurement of the Health Benefits of Investments in Water Supply			x					x		b			a,d	
A Hand Pump for Rural Areas of Developing Countries		x				x		x	x	b		c	a	
Dominant Issues in Nuclear Safety		x		x						b			a	
Sectoral Adjustments to Higher Energy Costs--Power	x	x	x	x	x	x	x	x	x	b		a,c	a,b	
Public Utility Pricing and Investment	x		x					x	x	b		c	a,b	
Rural Electrification in Liberia	x		x	x		x			x	b,c		c	a,b,d	
Energy Demand Forecasting: A Critical Review of Current Approaches	x	x	x	x				x		b			a	
Energy Supply-Demand Outlook, 1980-1985			x	x	x	x	x	x	x	b		a,b	a	
Potential of Non-Conventional Energy Sources for Northeast Brazil and a Recommended Research and Development Program		x	x		x	x			x	b			a	
Use of Solar Water Heaters in India		x	x		x	x			x	b		a	a	
Energy for Development	x		x	x	x	x	x			b		a	a	
Coal: State of the Art									x	b			a	
An Assessment of the Petroleum Prospects of Certain Developing Nations			x	x			x	x	x	b		b	a	

1/ (a) regional staff; (b) EWT staff; (c) borrower; (d) other departments

2/ (a) other CPS departments; (b) DPS; (c) regional departments

3/ (a) consultants; (b) borrowers; (c) suppliers; (d) other research/international groups

ANNEX 7

TABLE 3

IAT RESEARCH PROJECTS AS RELATED TO VARIOUS FUNCTIONAL CATEGORIES, 1972 - 1978

TITLE	ECOLOGY	SOCIO-CULTURAL	ECONOMICS	FINANCE	TECHNOLOGY	AGRICULTURE AND RURAL DEVELOPMENT	INDUSTRY	TRANSPORTATION	URBANIZATION	TOURISM
Analysis of Problems and Issues in Village Electrification		x	x	x	x	x	x			
Pricing and Investment in Electricity Supply			x	x						
Village Water Supply		x	x	x	x	x				
Standards of Reliability of Urban Electricity Supply		x	x		x				x	
Pricing and Investment in Telecommunications		x	x	x	x	x		x	x	
Appropriate Technology for Water Supply and Waste Disposal	x	x	x	x	x	x	x		x	
Oil and Gas Potential of Oil-Importing Developing Countries			x	x	x					
Design of Low Cost Water Distribution Systems			x		x	x			x	
An Approach to Planning and Implementing Rural Energy Projects (Report on Pilot Exercise in Colombia)		x	x	x	x	x				
Economics of Telecommunications in Papua New Guinea		x	x	x	x	x		x		
Rural Water Supply		x	x	x	x	x				
Wastewater Reuse (Agricultural and Industrial)	x	x	x	x	x	x	x			x
Fabrication of PVC Well Screens					x					
Pipelines					x					
Reduction of Unaccounted for Water		x			x					
Domestic Water Meters			x		x					
Reduction in Waste Water from Public Hydrants					x					
Testing of Wood Bearings for Hand Pumps					x					
Measurement of the Health Benefits of Investments in Water Supply	x	x	x	x	x					
A Hand Pump for Rural Areas of Developing Countries		x	x		x	x				
Dominant Issues in Nuclear Safety			x	x	x					
Sectoral Adjustments to Higher Energy Costs--Power			x	x						
Public Utility Pricing and Investment				x	x	x				
Rural Electrification in Liberia			x	x	x					
Energy Demand Forecasting: A Critical Review of Current Approaches			x		x					
Energy Supply-Demand Outlook, 1980-1985			x		x					
Potential of Non-Conventional Energy Sources for Northeast Brazil and a Recommended Research and Development Program			x		x					
Use of Solar Water Heaters in India			x	x	x					
Energy for Development			x		x					
Coal: State of the Art					x					
An Assessment of the Petroleum Prospects of Certain Developing Nations			x		x					

TABLE 1

SFR RESEARCH PROJECTS, 1972 - 1978--IMPACT AND DISSEMINATION

TITLE	POLICY FORMATION	METHODOLOGY INNOVATION	TECHNICAL INNOVATION	FACT-FINDING/ PREPARATORY	IMPROVE LOCAL CAPABILITIES	FORM OF DISSEMINATION ^{1/}	DESTINATION ^{2/}
Analysis of Problems and Issues in Village Electrification	x	x		x	x	a,b,c,d	a,c,d,e
Pricing and Investment in Electricity Supply	x	x			x	a,b,c,d	a,c,d,e
Village Water Supply	x			x	x	a,b,c,d	a,c,d,e
Standards of Reliability of Urban Electricity Supply		x	x		x	a,b,c,d	a,c,d,e
Pricing and Investment in Telecommunications	x	x		x	x	b,c,d	a,c,d,e
Appropriate Technology for Water Supply and Waste Disposal	x	x	x	x	x	b,c,d,e	a,c,d,e
Oil and Gas Potential of Oil-Importing Developing Countries	x			x		b	a,b,c,e
Design of Low Cost Water Distribution Systems		x	x	x	x	b,c,d	a,c,d,e
An Approach to Planning and Implementing Rural Energy Projects (Report on Pilot Exercise in Colombia)	x	x		x	x	b,c	a,c,d,e
Economics of Telecommunications in Papua New Guinea	x			x	x	b,c	a,c,d
Rural Water Supply	x			x	x	b,c	a,c,d
Wastewater Reuse (Agricultural and Industrial)			x	x	x	b,c	a,c,d,e
Fabrication of PVC Well Screens			x	x	x	b,c	a,c,d,e
Pipelines			x	x	x	b,c	a,c,d,e
Reduction of Unaccounted for Water			x	x	x	b,c	a,c,d,e
Domestic Water Meters			x	x	x	b,c	a,c,d,e
Reduction in Waste Water from Public Hydrants			x	x	x	b,c	a,c,d,e
Testing of Wood Bearings for Hand Pumps			x	x	x	b,c	a,c,d,e
Measurement of the Health Benefits of Investments in Water Supply	x					b,c	a,c,d,e
A Hand Pump for Rural Areas of Developing Countries			x		x	b,c	a,c,d,e
Dominant Issues in Nuclear Safety	x			x		b,c	a,b,c
Sectoral Adjustments to Higher Energy Costs--Power				x		b	a,b,c
Public Utility Pricing and Investment	x	x			x	a,b,c,d	a,c,d,e
Rural Electrification in Liberia	x			x	x	b,d	c,d,e
Energy Demand Forecasting: A Critical Review of Current Approaches	x	x		x		b,c	a,b,c,e
Energy Supply-Demand Outlook, 1980-1985	x			x		b	a,b,c
Potential of Non-Conventional Energy Sources for Northeast Brazil and a Recommended Research and Development Program			x	x	x	b	a,c,d
Use of Solar Water Heaters in India		x		x		b	a,c,d
Energy for Development				x		b	a,c,d
Coal: State of the Art				x		b	a,c,d
An Assessment of the Petroleum Prospects of Certain Developing Nations	x			x		b	a,b,c

1/ (a) book; (b) in-house publication; (c) staff seminars; (d) outside seminars; (e) pilot projects

2/ (a) other OPS departments; (b) DFS; (c) regional departments; (d) borrower; (e) other

Description of EWT Research Projects, 1972-1978

Water Supply and Wastes

Aware that benefits of national income growth in many countries of the developing world tend to bypass the poorest elements of society, the World Bank has in recent years given increasing attention to investment programs and policies promising direct benefits to lower-income groups. In this regard, hastening the extension of basic services such as water supply and sanitation to less privileged members of society is felt to be of primary importance. The study entitled Village Water Supply (completed 1975) focuses on the special problems that must be overcome if rapid improvement in this area is to be achieved.

The majority of the poor are found in the rural areas of most developing countries, a fact clearly reflected in the extent to which urban and rural communities have access to a potable water supply and adequate means of waste disposal. Because the technical issues are fairly straightforward and well understood, this study emphasizes the economic, social, financial and administrative issues characteristic of village water supply and sanitation programs, highlights those factors that are conducive to success or failure of village water supply programs, and makes policy recommendations accordingly. Although these recommendations are directed to the special circumstances of rural communities, they are also relevant to provision of adequate water supply and sanitation facilities to the poor--and not so poor--in urban areas of developing countries.

The general principles outlined in this study have been subjected to further empirical testing in the research project Rural Water Supply (1978). In

this study a review of a number of rural water supply systems was carried out to determine the common factors which contribute to the success/failure of water supply programs. Projects and programs have been analyzed with respect to their technical, financial, organizational and managerial aspects in order to identify characteristics which may be adapted to help improve existing programs or the development of new projects. Justification of such projects is clearly influenced by their impact on employment in developing countries in which unemployment and underemployment are of major concern.

The research in village water supply highlighted the problem of our inability to quantify the benefits of investments in the sector. In particular, while it has been established that water can carry a vector of diseases and that the provision of a safe and adequate supply is one of the essentials for protection of the public health, efforts over many years to quantify the health benefits to permit prediction of the likely effects on health of such supplies have been unsuccessful. In order to address the issues of Measurement of the Health Benefits of Investments in Water Supply (1975), the Bank commissioned a background paper and convened a panel of experts in medical epidemiology, sanitary engineering and economics to advise whether the impact of water supply investments on health could be reliably predicted and quantified so as to assist in development planning, and, if so, what field studies and methodologies would be appropriate. The panel concluded that the benefits could not be quantified given the present state of knowledge, and that studies to establish

a rigorous relationship between water supply and health would be extremely expensive and their conclusions would be of doubtful application. The panel recommended that, in order to gradually build up knowledge in this area, the Bank might be associated with initially modest impact studies, in which one or two diseases are closely analyzed.

In order to bring about a rapid improvement in the access of adequate water supply and sanitation facilities to low income groups, it is necessary to ensure that service standards are not unduly high, and that appropriate technologies are employed. Research in the water and wastes sectors has in fact been dominated by this aspect. Thus the study, Design of Low Cost Water Distribution Systems (1978) addresses the problem that designers of water distribution systems have not had available simple analytical tools with which to test the effect on system costs of various design assumptions. In consequence, secondary distribution networks have often been designed by rule of thumb without a full appreciation of the effects of the designer's decisions. The effects of the resulting overdesign can be very serious, particularly where service to the urban poor is concerned and levels of affordability are low. This project presents the results of rigorous analyses of secondary distribution systems for several urban areas in developing countries; from these analyses, simple mathematical models are developed which permit prediction of total pipe length, average diameter and network cost given decisions on variables such as per capita usage and spacing of public standpipes or house connections. Examples are given of the application of these equations to typical design problems.

Research has also been carried out on specific components of water supply projects. A study entitled A Hand Pump for Rural Areas of Developing Countries (1976) originated in light of the fact that, while use of shallow

wells and hand pumps is generally the best approach to supplying rural populations, existing hand pumps are expensive, complicated, and have a high failure rate. The report suggests a very simple new pattern of handpump, in which polyvinyl chloride well casing is used as the pump cylinder, and other components can be standardized and mass-produced. The pump is suitable for maintenance by villagers with minimal mechanical skills.

On the same theme, the feasibility of using wood handles for hand pumps was investigated in a laboratory study of the behavior of metal/wood interfaces. In the study Testing of Wood Bearings for Hand Pumps (1978), eight wood handles equipped with simple pivots were subjected to oscillating motion with a load of 150 pounds simulating the operation of a hand pump. The results, after 2×10^6 cycles, indicate that (1) woods impregnated with oil are more durable than dry ones, (2) galvanized pipe pivots function well, and (3) hardwoods are more durable than softwoods. A design technique for determining the required dimension of a hand pump handle based on the type of wood, load and level of hand pump usage intensity is presented.

Another study, Fabrication of PVC Well Screens (1978), is directed to developing a well screen that can be manufactured in developing countries at a lower cost than those presently used. A well screen of PVC pipe with modified cross-section and subsequent manual slotting, suitable for rural water projects, has been developed. Pilot fabrication of PVC well screens has been carried out in order to develop techniques appropriate to developing countries.

The problem of wasteful use of water is a familiar one in developing countries, and a number of research projects have addressed this issue. The study Reduction in Waste Water from Public Hydrants (1977) notes that the public hydrants used to dispense water to poor urban and rural communities are frequently uncontrolled, running continuously and wasting substantial amounts of water.

The objective of this study was to identify, for developing countries, those methods of dispensing water at public hydrants that have proved successful in reducing wastage and afford ease of operation and maintenance. Following a literature survey, discussions were held with water supply specialists, including manufacturers, institutes, and water supply authorities. Subsequently, visits were made to a number of countries in Africa, Asia, and Latin America, where public hydrants are in use.

Two studies with similar objectives to the foregoing, i.e. Reduction in Unaccounted for Water (1977) and Domestic Water Meters (1977) resulted in unsatisfactory reports, which were not released.

Somewhat contrasting with other technical research in the sector is the Pipelines study (continuing). This project will yield a state-of-the-art report and specification review on the design and construction of large diameter pipelines. The paper will analyze the Bank's experience in water supply and sewerage projects and will recommend procedures to be followed in future projects, reflecting present technological developments in pipeline fabrication and installation. The study will draw upon Bank experience with irrigation and petroleum pipelines as well as municipal water supply and sewerage.

The main research effort in the water supply and waste sector is concerned with waste disposal. A number of studies have been proceeding in parallel. One of these currently under way is Wastewater Reuse (Agricultural

and Industrial), in which a state-of-the-art paper and manual are being developed on the potential of wastewater reuse in both agricultural and industrial applications. The study will include analyses of reuse projects currently underway, as well as a discussion of technical and institutional characteristics necessary for successful wastewater reuse. The materials resulting from the study will be directed toward Bank engineers involved in project development, monitoring, management and evaluation.

By far the most ambitious project in this general area is Appropriate Technology for Water Supply and Waste Disposal (1978). This project was undertaken in light of estimates that it will take at least \$60,000 million to supply safe water in developing countries and some \$200,000 million more to dispose of it properly. Increased efficiency of investments by the World Bank and its member countries in these sectors is urgently needed to improve public health and sanitation, productivity, and the quality of life.

The objective of this study is to identify the appropriate technology for providing the urban poor and rural communities with socially and environmentally acceptable water supply and waste disposal services at a cost they can afford. The research is being directed to water supply and waste disposal (including reuse) although emphasis is on the latter. Total economic costs, rather than merely financial costs, are analyzed.

A total of 29 countries were scheduled for study. Of these, 14 were selected for detailed field studies. The others were included to provide specialized information or locations for pilot projects. Collectively, the countries include a variety of stages of development, technologies, cultural and industrial forms, and environmental features.

In the study's first phase, a detailed bibliographic search was undertaken for literature relevant to low-cost waste disposal technologies. At the same time, field work was initiated in the Republic of China (Taiwan), Japan, and the Republic of Korea. The bibliographic search identified very few (500 out of 17,000) publications on low-cost waste disposal methods potentially suited for developing countries. Even the relevant works contained little systematic evaluation of the economic and health tradeoffs of various systems of waste technologies or their relation to water supply needs. However, field work in 11 villages and cities in East Asia with populations ranging from 285 to 1.5 million has demonstrated that not only are such alternatives functioning successfully, but the possibility for replication elsewhere is high.

The second phase involved field work in 11 additional countries with special emphasis on the design of integrated pilot project schemes. The final products of the research include bibliographies and reports on the state of the art, as well as guidelines and instructional materials for use by decision makers in development agencies, developing countries, consulting engineering organizations, and universities. These will be of assistance in technical and economic evaluation of alternative water supply and waste disposal projects or urban projects with a water supply component.

Telecommunications

The traditional approach to pricing and investment policy in telecommunications is based almost entirely upon technical and financial criteria, with economic analysis playing a minor role. The study Pricing and Investment

in Telecommunications (1978) contains an analysis of the nature of the benefits and the types of beneficiaries of telecommunication projects, the economic benefits and costs of such projects, and appropriate pricing strategies. Its ultimate objective is to assist telecommunication authorities and other planning bodies in determining the appropriate level of investment in telecommunication projects and the priorities assigned to competing demands within the sector.

The study contains a survey of the literature on the benefits of telecommunications, and concludes that pricing policy is of paramount importance both in demonstrating the justification of investment in the sector as well as in mobilizing the financial resources to do so. The relevance of the concept of marginal cost for pricing purposes, and a method of calculating it, are treated in a developing country context in which unsatisfied demand and system congestion are the rule. In view of the reluctance of budgetary authorities to approve an adequate rate of expansion of telecommunications when economic and financial justification appears to be overwhelming, the study also analyzes a number of cases in which the nature of beneficiaries and usage have been estimated. Empirical work done on costs and benefits in Costa Rica, India and a number of other countries is described. A parallel study, Economics of Telecommunications in Papua New Guinea (1978), was devised jointly by staff of the Bank and the Papua New Guinea Department of Posts and Telegraphs, and specifically addresses the problem of determining the nature of telecommunications usage. Extensive surveys of telephone users and potential uses were conducted in light of a perceived need to encourage local, rather than expatriate, use of telecommunications. Certain lessons for pricing and the composition and magnitude of the investment program resulted from the study.

Power

The largest research study in this sector has been Analysis of Problems and Issues in Village Electrification (1975). As this project demonstrates, the appraisal of a village electrification program poses particular difficulties because, in many instances, the annual financial return to the utility is low in the early years of the project. This is the result of high capital costs of installation, high operating costs per unit, low load density and low utilization.

This project, which used the program in El Salvador as the major case study, focuses on the measurement of the social costs and benefits, and develops criteria for evaluating the scope and composition of village electrification programs in light of these difficulties.

The research considered the effects of electricity supply on farms, agro-industries, rural commerce, households and the general development of villages. In addition, the importance of electricity is examined in relation to infrastructure projects, such as water supplies, schools, feeder roads, and support programs for rural industry and agriculture. Recommendations are made regarding appropriate pricing, institutional, technical and general project evaluation policies. Adaptation of these general principles to West African conditions is contained in the study Rural Electrification in Liberia (1977). Although the main focus of the study, which was prepared upon the request of UPDEA, was on Liberia, some analysis of the rural electrification issues in a number of other West African countries was conducted. The study covered all phases of planning rural electrification schemes, including choice of technical alternatives, selection of priority villages, pricing policy and institutional arrangements.

The study Pricing and Investment in Electricity Supply (1976) is concerned with improving the criteria for investment and pricing in electric power. The research effort centers on the problems of determining least-cost investment programs for given levels of demand as well as the pricing and investment rules relevant in the more general case when the optimal supply level must also be determined. Three case studies were undertaken--in Sudan, Tunisia and Turkey. The Turkish study uses linear programming models to analyze the least-cost investment program and the associated operating schedules for a 35-year period. The sensitivity of the results for the shadow prices of capital, labor and foreign exchange are tested with respect to changes in capital and operating costs, changes in demand forecasts, changes in resource availability, and changes in a number of other economic and technical parameters. Computer printouts plot optimal investment and output patterns for various types of investments and operating costs. In addition the program has been used for the analysis of power projects under conditions of uncertainty caused by cost escalation and changing oil prices.

The studies undertaken in Sudan and Tunisia deal with optimal pricing. The research on optimum pricing extends peak-load pricing theory to include the effects of random changes in demand and supply conditions. Various problems, such as those connected with seasonality, indivisibility, choice of metering and tariff types were also studied.

This study was completed under the heading of another research project, Public Utility Pricing and Investment (1977). This involved a further power pricing case study (for Thailand), in which estimates are made of incremental system costs in a mixed hydrothermal system where one generating and two distribution authorities are involved. The project also contains an analysis of one particular difficulty that is faced in applying

marginal cost pricing, namely the treatment of capital indivisibility. Although presented in a water supply context, the general conclusions are equally valid for electric power.

The study, Standards of Reliability of Urban Electricity Supply (1978), addresses the problem that target reliability levels for electric power have hitherto been determined by rules of thumb and past practice. Heavy expenditures devoted to the electric power sector relative to the scarcity of capital and foreign exchange in developing countries underline the importance of using economic criteria in establishing reliability standards. Furthermore, there is a need to improve the techniques for long-range planning for distribution systems, which are not as well developed as the methods used in the planning of generation and transmission systems. This study, therefore, aims to help determine appropriate reliability criteria based on economic considerations, and to use this information to optimize the planning of distribution systems.

The research effort comprises two phases. The first consists of a review of the state of the art and an examination of the situation in Mexico. Findings from this review suggest that considerable scope exists for improving the cost effectiveness of distribution system design, particularly through better forecasts of initial loads and of the expected rate of load growth.

The case study examined the distribution expansion programs of Guadalajara and Monterrey, Mexico. The results suggested that no marked reduction in overall costs can be obtained for these two cities by lowering standards of supply, other than possible marginal savings from the acceptance of larger voltage variations. Since adequate data on system reliability were unavailable, it was not possible to quantify the appropriate economic balance between system design costs and outage costs for varying levels of security. The Mexican case study concluded that appreciable savings were unlikely from

a relaxation of overhead distribution construction standards, but that substantial savings should be possible on underground systems.

Following two smaller exercises, a case study of the cost of power outages in Jamaica, and a literature review, the second major phase of the project focuses on the economic aspects, using a case study of the city of Cascavel, in the State of Parana, Brazil. The tasks of this phase are twofold: (1) to develop a theory and methodology for estimating the economic costs of electric power outages suitable for developing countries (bearing in mind the scarcity of data), and to apply the methodology in the field; and (2) to combine the outage cost results with a distribution system planning model and implement the whole on a computer so that it may be used for long-range distribution system planning.

Other smaller but nevertheless highly important research topics were those covered in Dominant Issues in Nuclear Safety (1974), and Sectoral Adjustments to Higher Energy Costs - Power (1974). The former formed the background material to support the conclusions presented in the Board Paper Nuclear Power: Its Significance For the Developing World. It discusses routine radioactive emissions, severe nuclear accidents, diversion of nuclear materials, waste disposal, licensing and regulations. It is mainly addressed to the controversy on the safety of light water reactors, and contains a bibliography on the subject. The latter project examines the impact of higher fuel costs on generating costs for various types of plants; on demand for electricity; on investment choices for generation and transmission; and, finally, reviews the likely effects on power planning in LDCs, identifying five groups from the hardest hit and least likely to adjust in the medium term, to those which can most easily overcome the effects.

Energy

The nature of the energy problem and, in particular, the need to determine Bank lending policy in this area, has meant that research has tended to be more macroeconomic--or global--in nature, and has tended also to emphasize survey-type of work. Thus in 1974 An Assessment of the Petroleum Prospects of Certain Developing Nations was prepared which estimated the large potential value of "undiscovered" oil reserves in LDCs (in part due to the skewed distribution of exploratory drilling in favor of developed countries). The project Oil and Gas Potential of Oil-Importing Developing Countries (1976) consisted of a large survey exercise, which while the analytical content was not great, was of inestimable value in determining the role the Bank could play in this area. The paper is currently being updated. The study, Energy Supply-Demand Outlook 1980-85 (1974) is similar in scope. It analyzes past trends in supply and demand of energy; non-OPEC energy supply options for the period up to 1985 including traditional (coal, oil, gas, hydro) and non-traditional sources (oil shale, tar sands, synthetic hydrocarbons, etc.); the petroleum potential of oil importing LDCs; energy demand price and income elasticities; fuel substitution and conservation possibilities; and scenarios for energy balances in 1980 and 1985 under various oil price assumptions. Another survey is the study Coal: State of the Art (1974), which reviews the state of knowledge on coal resources, production, consumption and trade. It discusses major uses of coal, production methods and costs, prices in different regions, prospects for increasing supplies, coal gasification and liquefaction.

Much attention has been paid to the problem of demand forecasting. The first of such studies, Energy Demand Forecasting: A Critical Review of Current Approaches (1977), concentrates on the methodological approaches for energy demand forecasting, reviews the various approaches reported in the literature and draws some conclusions on their applicability in the developing countries. Following an analysis of the special characteristics of the energy

demand forecasting problem it describes simple approaches for total energy demand forecasting, based on projections of GNP and also the more sophisticated input-output and econometric modeling approaches for energy demand forecasting. In this process, it also reviews some of the integrated energy-economic models which attempt to describe the relationship between the energy sectors and the general economy.

The practice followed for energy demand forecasting by various public agencies in the USA, UK, Canada and India is also described in some detail in addition to the description of analytical methodologies. Based on an analysis of these studies, various methodologies used and their applicability to the conditions prevailing in the developing countries, the concluding chapter of the paper provides some suggestions on how energy demand forecasting should be carried out in the developing countries.

Following this exercise, the study Energy for Development (1978) developed methods of forecasting the demand for energy in developing countries. A major feature of the study was the emphasis given to describing and forecasting the demand for non-commercial fuels in rural areas. Some idea of the predominant importance of non-commercial energy in overall energy use in developing countries is given, and an examination of basic energy needs is also presented.

Inadequate supply of rural energy is being recognized as a major development problem. Non-commercial fuels such as fuelwood, agricultural waste and animal dung are now often the only energy sources available in rural areas and are becoming increasingly insufficient to meet rising rural energy demand for basic needs as well as production activities. Moreover, large scale rural use of these fuels is causing widespread deforestation and soil erosion. The research project An Approach to Planning and Implementing Rural Energy Projects

(1978) had as its objective to develop a practical approach for identifying, preparing and implementing rural energy projects and programs. For this purpose, a pilot exercise was carried out in Colombia. The first phase of the research involved qualitative studies in selected rural areas to define the relationship between energy and rural development. The second phase involved the detailed preparation of rural energy plans, development and testing of rural energy equipment, and implementation of pilot projects in selected rural areas to test the institutional and infrastructure requirements for a large-scale rural energy project.

The fundamental aspect of this approach is to rely almost completely on local expertise and institutions for the design and execution of these projects and most of the work here described has in fact been carried out by the Colombians. This project analyzes the Bank's role so far, and proposes directions for future work; although it deals with the specific case of Colombia, it provides an approach applicable to most other LDCs. The first part of the final report outlines the approach that has been developed. The second part deals in greater detail with the specific activities carried out in Colombia.

Other research has been conducted on the feasibility of using non-conventional energy in rural areas. One project, Potential of Non-Conventional Energy Sources for Northeast Brazil (1976) included technical assistance on the evaluation of solar heat applications to Sudene, Northeast Brazil, while state-of-the-art lectures were provided to Brazilian authorities. The project resulted in a report on the formulation of a program for the use of non-conventional sources of energy, particularly solar, in Northeast Brazil. Use of Solar Water Heaters in India (1977) consisted of a quantitative study of potential markets and the possibility of manufacturing solar water heaters. Socioeconomic benefits of solar water heater applications as they accrue to private users as

well as to the national economy were evaluated. Technical, economic and financial factors which would have an influence on the widespread utilization of solar water heaters were identified.

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1. Energy, Water and Telecommunications Department Documents

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- RES 7 The Economic Cost of Power Outages: Methodology and Application to Jamaica
- RES 8 Costs of Electric Power Outages: A Review
- RES 9 A Hand Pump for Rural Areas of Developing Countries
- RES 10 Energy Demand Forecasting: A Critical Review of Current Approaches
- RES 11 Design of Low Cost Water Distribution Systems
- RES 12 Nightsoil Composting: State of the Art and Research: Pilot Study Needs
- RES 13 Testing of Wood Bearings for Hand Pumps
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- GAS 14 Shadow Pricing and Evaluation of Public Utility Projects
- PUN 12 Lahore Water Supply - Tariff Study
- PUN 16 Economics of Telecommunications in Papua New Guinea
- PUN 20 Measurement of the Health Benefits of Investments in Water Supply
- PUN 23 Bangkok Water Supply Tariff Study
- PUN 29 The Costs and Benefits of Water Metering
- PUN 34 An Approach to Planning and Implementing Rural Energy Projects (Report on a Pilot Exercise in Colombia)
- PUN 30 Telecommunications Pricing and Investment in Developing Countries
- PUN 37 Evaluation of Telephone Projects in Less Developed Countries

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The Leisure Cost of Electric Power Failures, Bank Staff Working Paper No. 285, 1978

3. Other

Access to Calls: A Perspective on the Economics of Telecommunications in Papua New Guinea, D. A. Evans and E. B. Bryan, December 1977.

A History of One Project: "Analysis of Problems and Issues in Village Electrification"

- December 1971: The Bank Sector Working Paper Electric Power drew attention to the problems of evaluating village electrification projects, and described why research was needed. Bank staff member Dennis Anderson started work on the project.
- January 1972: About 20 countries were requested to provide information on village electrification programs, policies, and problems. Following a field trip to Central America, El Salvador selected for case study; research proposal prepared, and submitted to Research Committee.
- July 1972: Research Project started. Field work in El Salvador consisted of comprehensive analysis of village electrification program, with in-depth surveys of household agro-industry, and farm consumers. The Universidad Centroamericana Jose Simeon Canas was the consultant and was responsible for the field work.
- 1973 PUNs issued and seminars to inform staff of lending potential; commissioning of policy paper; start of project identification through CPP review.
- February 1974: Consultant report submitted to the Bank.
- July 1974: Policy Paper - Issues in Rural Electrification, prepared by Dennis Anderson, submitted to the Board. (Subsequently published by the Bank and translated into French and Spanish.) After an introductory review of rural electrification in developing countries, the report discussed three main topics; (1) the prospects for successful investment in rural electrification; (2) approaches towards investment as regards economic justification, identification and preparation, finance, technical problems, and institutional problems; and (3) implications for Bank policy and procedures.
- September 1974: Iran - Preappraisal of rural electrification project assisted by D. Anderson.
- February 1975: Research Paper, Costs and Benefits of Rural Electrification - A Case Study in El Salvador, prepared by Dennis Anderson in collaboration with consultants from the Universidad Centroamericana Jose Simeon Canas, was issued by the then Public Utilities Department. This was a report on economic costs and benefits of electrifying villages, farms, and agro-industries in El Salvador. It contained a theoretical framework, cost analysis, empirical analysis of household and non-household uses of electricity and its substitutes in rural areas.
- Subsequently: Several power projects containing rural electrification components have been appraised by the Bank using the methodology developed in the research project, particularly with regard to identifying those areas meriting priority treatment in supplying electric power; in demand forecasting; pricing; and in use of the internal rate of

return criterion. For example, rural electrification projects in India; Thailand; Philippines; and Syria have benefitted from the research effort.

OFFICE MEMORANDUM

TO: Mr. Montague Yudelman, Director, AGR

DATE: September 13, 1978

FROM: Graham Donaldson, Chief, AGREP *GD*SUBJECT: AGREP Work Program: Part II - Policy Analysis and Studies - FY79

1. The major function of this Division is to undertake policy analysis and studies of development issues relating to the Bank's program in the area of agriculture and rural development. This is recognizably a research function, but the Division's activity in this respect is characterized by the fact that the expected output is a policy statement of one kind or another. Basically, we produce four kinds of policy statements: Sector Policy Papers, Operational Manual Statements, Central Projects Notes, and Informal Memoranda. Apart from these, it is accepted that background papers, written in the course of producing policy statements, will be published as Staff Working Papers whenever the opportunity allows.
2. The purpose in laying down a work program in this form is to provide more structure to our activities so that: (i) the Division's function and purpose may be clearly recognized, (ii) Division staff will have guidelines as to where their efforts should responsibly be channelled, and (iii) programs of activity can be developed so that all members of the Division can be effectively involved.
3. In putting together this program it has, of course, been necessary to take into account a number of constraints. These include the need to: (i) maintain the ongoing study program and provide continuity, (ii) accommodate the skills and interests of the present complement of Division staff, and (iii) make allowance for the time required and the type of background work necessary to facilitate the "Operational Support and Advice" activities of the Division. Apart from these constraints we are, of course, limited by the resources available and the short-run requirements of senior management.
4. As indicated in the following "Summary Work Program", our policy analysis and studies divide into three categories: (i) Lending Strategy - at this time almost exclusively devoted to food policy - which reflects the concerns raised in the "foodgrain policy" and "nutrition" papers, and is designed to meet the requirements of the World Food Council, the World Development Program and the Bank's operational activities in this area; (ii) Project Design, which builds on the "Rural Development Sector Policy Paper" and reflects the need for further definition of perspectives and refinement of processes appropriate to this area of Bank work, and (iii) Project Cycle Methodology, which aims to refine and reform the operational procedures used in the course of Bank lending, and to provide guidelines on procedures, standards, and criteria, related to Bank work in the rural sector. In addition to the main activities listed under these headings, there is a supplementary list of Ad Hoc Policy Activities. These deal with smaller (but not less important) issues that have arisen in the course of recent Bank activities.

5. There is a clear general logic underlying the program, as suggested in the foregoing. However, the subjects listed are neither mutually exclusive nor exhaustive, since the various activities relate to particular outputs and not to any highly refined conceptual framework. The brief "statements of intent" that are provided herewith are not intended to be either definitive or binding - since research involves, to a degree, a voyage of discovery - and because of the need to respond to the imperatives of changing management concerns, the program must be flexible. Thus, it may be subject to change at short notice.

6. Finally, the timing indicated should be regarded as tentative, for similar reasons of flexibility to meet competing exigencies. It is expected, however, that we should complete at least two major policy papers each year, and possibly more. Because of the competing demands that arise it is not expected that we will list policy papers with the Policy Review Committee until the background papers are well in hand and a reasonably reliable time frame for completion can be established.

cc: G.F. Darnell
L.E. Christoffersen
D. Turnham
D. Pickering
All Division Staff

GDonaldson:mt

AGRICULTURE AND RURAL DEVELOPMENT POLICY PAPERS

	<u>Project Design</u>	<u>Food Policy</u>
<u>Completed</u>	Rural Development Land Reform Agricultural Credit Land Settlement Rural Non-Farm Employment Technology and Innovation * Forestry Development	Foodgrains * Nutrition *
<u>Forthcoming:</u>	Fishery Development Field Mechanization Agricultural Research Livestock Development Tropical Root Crops	Food Security Prices and Subsidies Food Distribution
<u>Proposed:</u>	Extension and Participation Small-Scale Irrigation Rural Development Revisited Rural Financial Systems Irrigation Management	Post Harvest Activities Foodgrain Storage

* Not published as Sector Policy Papers.

POLICY ANALYSIS AND STUDIES - SUMMARY WORK PROGRAM - FY79

AGREP Staff
Responsibility

I. LENDING STRATEGY

- | | |
|---|------------------------------|
| 1. Food Security - Country Case Studies | Belai Abbai/O. Knudsen |
| 2. Agricultural Prices and Subsidies - Country Case Studies | G. Donaldson |
| 3. Food Distribution - Country Case Studies | Belai Abbai/
P. Scandizzo |

II. PROJECT DESIGN STUDIES

- | | |
|--|------------------|
| 1. Agricultural Innovation and Rural Development | G. Donaldson |
| 2. Management and Organization of Irrigation Projects | A. Sfeir-Younis |
| 3. Agricultural Research - Organization and Management | G. Donaldson |
| 4. Assessing National Priorities for Agricultural Research | A. Sfeir-Younis |
| 5. Consequences of Risk for Project Design | P. Scandizzo |
| 6. Field Mechanization & Rural Development | W. Cuddihy |
| 7. Fishery - Prospects and Problems | A. Sfeir-Younis |
| 8. Tropical Root Crops | J. Goering |
| 9. Role of Crop Insurance in Projects | J.D. Von Pischke |
| 10. Rural Financial Markets | J.D. Von Pischke |

III. PROJECT CYCLE METHODOLOGY

- | | |
|--|----------------------|
| 1. Agricultural Project Appraisal System (APAS) | J. Goering |
| 2. Project Processor/CB Display | G. Temple |
| 3. Cost/Benefit - Operational Procedures | W. Cuddihy/G. Temple |
| 4. Multi-Objective Criteria for Project Evaluation | A. Sfeir-Younis |
| 5. Monitoring and Evaluation in Projects | P. Scandizzo |
| 6. Analysis of Risk in Projects | P. Scandizzo |
| 7. Field Assessment of Financial Viability | J.D. Von Pischke |
| 8. Criteria for Location, Size and Sequencing of Rural Sector Projects | A. Sfeir-Younis |

STRATEGIES AND POLICY FOR FOODGRAIN SECURITY

A review and assessment of food security proposals and their relationship to rural development. The study focusses on the policy issues and past performance of international and country programs to meet food security. It will also review the methodology of projections on foodgrain needs and determine whether such projections accurately reflect the foodgrain situation. An alternative projection technique will be derived that focusses on aggregate consumption needs, given that certain distributional and institutional reforms are made. The study will then formulate alternative foodgrain schemes and determine their economic and political viability.

Among the policy issues that will be investigated are the feasibility of private and public holdings of buffer stocks; the question of centralized or decentralized locations, effects on production, the potential trade off between price stabilization and food security, the role of price and subsidy incentives in the holding of stocks, the balance between growth in production and emphasis on distribution, and the implications of food security to rural, national and global planning.

Responsibility:

Odin Knudsen

Participation:

Belai Abbai
Wilfred David

Timing:

Start	-	August 1, 1977
First Draft	-	June 1, 1978
Final Draft	-	September 30, 1978

Output: Staff Working Papers
Sector Policy Paper

AGRICULTURAL PRICES AND SUBSIDIES STUDY - 671-42

A review of pricing policies for farm commodities using informal and formal partial equilibrium analysis, supported by a review of literature and of previous Bank experience. The aims are:

- (i) to assess measures of the incentive effects and costs of various policies and to suggest tools for operational use; and
- (ii) to provide guidance on alternative policy mixes that might be used in developing country situations.

Responsibility:

Alvin Egbert

Participation:

Colin Bruce
(study design)

David Dapice
(policy implications)

Bill Cuddihy
(Egypt case study)

Judith Graves
(review Bank experience)

Hyung Kim
(Portugal case study)

Gilbert Brown, EPR
(Pakistan case study)

Consultants:

Carl Gotsch
(integrative paper)

Iqbal Sobhan
(review supply response)

Lucio Reca
(Argentine case study)

Trent Bertrand
(Thailand case study)

Peter McLoughlin
(Kenya case study)

continued

Consultants: (cont)

G. Cox and A. Rayner
(Yugoslav case study)

Yakir Plessner
(Mexico case study)

Timing:

Start	-	July 1, 1976
Case Studies	-	July 31, 1977
Background Papers	-	July 31, 1977
Integrative Paper	-	September 1, 1977
First Draft	-	September 30, 1977
Final Draft	-	September, 1978

Output: Staff Working Papers (6)

EVALUATION OF FOOD DISTRIBUTION SCHEMES

This study is part of the ongoing Food Security Work Program within Economics and Policy Division, Agricultural and Rural Development Department. The program originated in response to Bank concerns about the extent and nature of the food and nutrition problems, the Bank's intent to assist its client countries in planning their food strategies, and the request of the World Food Council that the international agencies should assist developing countries to determine the conditions required to achieve increased food production sufficient to meet food needs. Under the previous AGREP work program, a methodology was developed to relate the calorie intakes of different groups to income and food price levels and project the state of malnutrition under various policy alternatives. This methodology has been applied in eight country case studies.

Several major findings have emerged from these studies. The extent to which malnutrition is a widespread and serious problem in developing countries is demonstrated, and evidence is provided to suggest that food distribution and intervention schemes are necessary and will continue to be necessary in many countries. Furthermore, the projections indicate that, even with high rates of increase in food production, food prices will rise in these developing countries and contribute further to the malnutrition of various target groups, especially the landless and urban poor. As a consequence, the primary basic need - provision of adequate food intake - will continue to be a major focus of development policy. One major aspect of such policy will involve food distribution and intervention schemes. Currently there is a lack of information on the effectiveness, operation problems, relative impact, leakages and losses in disbursement of food distribution and intervention schemes. The primary objective

of this study on food distribution schemes is to bridge this gap - study the operational aspects of food distribution systems and explore alternative approaches to evaluating their effectiveness.

The study proposed has several parts: (i) a survey evaluating current food distribution systems and how they operate; (ii) an empirical study of alternative food distribution systems, their impact on several variables and the associated fiscal costs and economic costs and benefits; and (iii) exploration of alternative methodologies for the evaluation of food distribution systems and basic needs programs.

Some of the expected results that will be presented from this research are:

- (a) A survey that assesses the relative operational problems associated with food distribution and intervention schemes.
- (b) Estimates of fiscal costs, losses in producer incomes and consumption of subsistence producers and leakage to unintended beneficiaries of food distribution schemes.
- (c) A methodology and program for evaluation of alternative food distribution systems.
- (d) An evaluation of alternative methodologies to evaluate basic needs programs in nutrition.
- (e) Estimates of the social demand function for basic food needs.

<u>Responsibility:</u>	Belai Abbai/P.Scandizzo/OKnudsen
<u>Participation:</u>	Alan Berg, AGR
<u>Researchers:</u>	Lloyd Harbert Jane Li Patricia O'Brien
<u>Timing:</u> Start	August 1, 1978
First Draft	August 1, 1979
Final Draft	November 1, 1979
<u>Output:</u> Staff Working Paper (possible policy paper)	

AGRICULTURAL INNOVATION AND RURAL DEVELOPMENT - 671-44

The aim of this study is to construct a framework for a wider analysis of technology in the context of rural development using systems concepts. It is hoped this will provide a cohesive background for (i) designing farm technology packages appropriate to developing country situations, (ii) managing the transfer and adoption of technology, and (iii) for establishing policy for the generation and management of technology as a continuing process.

Responsibility:

Graham Donaldson

Consultants:

John McInerney
(conceptual analysis)

Frank Jarrett
(research and development)

John Rouse
(institutional aspects)

<u>Timing:</u>	Start	-	August 1, 1976
	First Draft	-	April 15, 1978
	Final Draft	-	August 31, 1978

Output: Review Issues Paper (March 15, 1977)
Staff Working Paper (August 31, 1978)

MANAGEMENT AND ORGANIZATION OF IRRIGATION PROJECTS - 671-39

This study was initiated to : (i) obtain relevant information on the organization, management and operation of selected irrigation projects; (ii) to analyse the effectiveness of these aspects relative to objectives; and (iii) to develop a framework for monitoring and evaluation of the resource use aspects of such projects.

Responsibility: F. Hotes/A. Sfeir-Younis

Consultants: A. Bottrell and
Staff of ODI (UK)

Participation: Advisory Panel
or 10 Bank Staff

Timing: Start - July 1, 1975
Final Report - January 31, 1979

AGRICULTURAL RESEARCH - ORGANIZATION AND MANAGEMENT

The purpose of this study is to examine alternative policies, institutional arrangements and management modes for use in national agricultural research programs in developing countries. This requires, first, specification of the purpose and proposed goals for agricultural research programs and, second, determining the best means of pursuing them.

Responsibility: G. Donaldson/J. Fransen

Participation: J. Coulter, CGFPI

Consultants: W. McNally/G. Scobie

Timing: Start October 1, 1978

First Draft January, 1979

Final Draft June, 1979

Output: Staff Working Paper
(possible sector policy paper)

ASSESSING NATIONAL PRIORITIES FOR AGRICULTURAL RESEARCH

The purpose of this study is to review existing methods and to propose new methods for alleviating the national budget in agricultural research. This study intends to take a micro-economic approach using pre-statistical national priorities and/or micro-economic targets such as self-sufficiency in a number of crops, benefiting a particular group of farmers, or intensifying the existing trade advantages. Within this context, the government may decide to allocate funds to research about these commodities which poor farmers are cultivating or any other type of social objectives. The study will evaluate the existing methods for the allocation of national funds for agricultural research from a national standpoint rather than from the researcher's point of view.

<u>Responsibility:</u>	Alfredo Sfeir-Younis
<u>Participation:</u>	
<u>Consultant:</u>	Not specified.
<u>Timing:</u>	Start
	January 1980
	First draft -
	January 1981
	Final draft -
	March 1981
<u>Output:</u>	Staff Working Paper

CONSEQUENCES OF RISK FOR PROJECT DESIGN

This project has two broad objectives: (i) to derive systematic conclusions about the role of risk in influencing farmer's decisions in developing country situations, and (ii) to examine some of the micro and macro implications of risk for project design. The risk effects and possible project design modifications will be investigated more fully for five different types of agricultural projects.

Responsibility:

Pasquale Scandizzo

Participation:

A. Sfeir-Younis
Bill Cuddihy

Consultant:

Don Winkleman, CIMMYT

Timing: Start

-

November 15, 1978

First Draft

-

December 31, 1979

Output: Staff Working Paper
(possible policy paper)

FIELD MECHANIZATION AND RURAL DEVELOPMENT

The aim of this study is to examine the combinations of technical hardware, institutional arrangements and policy instruments best suited to the mechanization of agricultural field operations in a range of typical developing country situations. It will build on the study of "Agricultural Technology and Rural Development" and the case studies of tractorization in India and Pakistan as well as other experiences. The study will involve an additional case study of the Philippines mechanization program.

<u>Responsibility:</u>	Bill Cuddihy
<u>Participation:</u>	Charles Downing (technical aspects)
	Graham Donaldson (institutions)
<u>Consultants:</u>	V. Ramachandran
<u>Timing:</u> Start	September 1, 1977
First Draft	July 31, 1978
Final Draft	November 15, 1978
<u>Output:</u> Staff Working Paper (possible policy paper)	

FISHERY - DEVELOPMENT PROSPECTS AND PROBLEMS

The purpose of this study is to assess the present state of fishery activity in developing countries and to evaluate its potential contribution to rural development, and the constraints on realizing this potential. The study will examine policy objectives and means for promoting the development of rural poor people through fishery development, with particular reference to the social dimensions.

<u>Responsibility:</u>	A. Sfeir-Younis
<u>Participation:</u>	L. Sprague & F. Kada (technical)
<u>Consultants:</u>	Donald Emmerson (socio-political aspects)
	FAO staff (resources - technical)
<u>Timing:</u> Start	December 1, 1977
First Draft	February 15, 1979
Final Draft	May 31, 1979

TROPICAL ROOT CROPS

This study examines the production and use of root crops (cassava, sweet potato, potato, yams, taro/coco yams, and others) and their current role and future potential in development - especially with respect to their function as the basic food source for the poorest rural groups. On the production side both economic and agronomic aspects are being studied, and on the consumption side both processing and nutrition aspects.

<u>Responsibility:</u>	Jim Goering
<u>Participation:</u>	Douglas Forno, AEP, (production technology)
<u>Consultant:</u>	Truman Phillips (trade aspects)
<u>Timing:</u> Start	July 1, 1977
Background Papers	December 1, 1977
First Draft	May 1978
Final Draft	September 1978
<u>Output:</u> Staff Working Paper	

ROLE OF CROP INSURANCE IN PROJECTS

Crop insurance schemes may provide a means of insulating farmers from adversity in the form of poor harvests, and of ensuring the liquidity of farm credit institutions in situations in which borrowers are unable to repay because of partial or total crop failure. Intervention to achieve these ends is inherently attractive in theory, and a major bilateral donor is already launching field experiments in crop insurance among small farmers with relatively large exposures to uncertainty in adopting new crop enterprises. At the same time, the theoretical attractiveness of crop insurance is greatly offset by the institutional problems which crop insurance administration would impose. Crop insurance administration would require many of the same skills and involves many of the same vulnerabilities as farm credit administration. Based on the experience of many farm credit intermediaries, considerable caution may be required in evaluating the prospects for crop insurance schemes. In addition, crop insurance schemes should not be merely a mechanism for interventionist sleight-of-hand in absorbing the losses of farm credit institutions.

<u>Responsibility:</u>	J.D. Von Pischke
<u>Timing:</u> Start	August 15, 1978
First Draft	February 1, 1979
Final Draft	May 1, 1979
<u>Output:</u> Staff Working Paper	

RURAL FINANCIAL MARKETS

Rural people are rarely viewed as potential users of financial services. However, the conventional approach frequently involves the use of rural financial markets to achieve rural development goals, as seen in agricultural credit projects, cooperative projects involving loans to members, and assistance to rural industries. Under these initiatives, high sums have been injected into rural financial markets by donors. Further attention is being directed obliquely at rural financial performance through the subject of interest rates. The purpose of this study will be to provide a framework for viewing intervention in and performance of those aspects of rural financial markets which concern planners and development agencies. These aspects include market structure and efficiency, interest rates, services offered and levels of access, within the larger context of resource allocation. Special emphasis will be devoted to the lagging performance of farm credit institutions often observed by donors, and to difficulties experienced in institution building in rural financial markets.

<u>Responsibility:</u>	J. D. Von Pischke
<u>Consultants:</u>	not yet selected
<u>Timing:</u> Start	January 1, 1979
End Preparation	June 30, 1979
First Draft	December 31, 1979
Final Draft	April 30, 1980
<u>Output:</u>	Staff Working Paper/Sector Policy Paper

AGRICULTURAL PROJECT APPRAISAL SYSTEM (APAS)

This activity involves the development of a formalized procedure for the financial and economic analysis of agricultural projects - providing financial, economic and social rates of return and net present value. The procedure will utilize farm models of various kinds which can be combined and aggregated to simulate the whole project structure. The purpose is to provide a rigorous standardized procedure for project appraisal, which might be applied during project preparation and modified as the proposal is refined.

Responsibility:

Phase I Al. Egbert
Phase II Jim Goering

Participation:

Patty Hamsher, CAD
(programming)

Hyung Kim
(enhancements & support)

Young Kimaro
(applications & support)

Timing: Start

February 1975

Phase I

June 30, 1977

Phase II

December 30, 1978

Output: APAS Operational Manual

PROJECT PROCESSOR - CB/DISPLAY

Development of an interactive software system to assist in the economic and financial analysis required in the appraisal of agricultural and rural development projects. The first phase is a sub-program entitled CB/DISPLAY which performs sensitivity analysis on investment benefit and cost streams. Subsequent phases will result in a data processing system which allows project analysts to perform basic manipulation on raw data gathering during project appraisal, submit processed data sets to existing programs including APAS, and construct specialized tables tailored to the individual needs of their own appraisal report.

Responsibility:

Gordon Temple

Participation:

Bill Cuddihy (Technical review)

Young Kimaro (Applications and support)

Nancy Pinto (Syntax development)

Consultants:

Troy Klein

Timing: Start

June 1977

CB/DISPLAY

June 1978

Data Generation &
Subroutines

October 1978

Table Maker

January 1979

Inter-face with other
programs

March 1979

Output: Separate Manuals for CB/DISPLAY, Data Generation,

Table Maker, PROJECT/PROCESSOR

COST/BENEFIT - OPERATIONAL PROCEDURES

The purpose of this program is to examine aspects of cost-benefit methodology that cause difficulties in operational application. It will focus particularly on elements of the methodology that cause problems in the process of its operational use. Examples of issues to be studied include: (i) estimation of shadow wage rates, (ii) estimation of shadow foreign exchange rates and (iii) the presentation of rates of return and net present values and their possible ranges due to estimation errors. The intention is to provide improved operational guidelines or "rules of thumb".

<u>Responsibility:</u>	Bill Cuddihy/Gordon Temple
<u>Participation:</u>	Jim Goering A. Sfeir-Younis Pasquale Scandizzo
<u>Consultants:</u>	None proposed
<u>Timing:</u> Start	September 1, 1978
First Output	December 15, 1978
Second Output	April 15, 1979
Third Output	July 15, 1979
<u>Output:</u> New Guidelines (produced intermittently)	

CRITERIA FOR LOCATION, SIZE AND SEQUENCING OF RURAL SECTOR PROJECTS

(a) Location: Decisions as to where to locate projects, and how many districts, provinces or even towns should be incorporated into any given project, greatly affect the performance of such projects. We will study some of the criteria which influence these location decisions. Another criteria may be just the opposite. Such decisions have to be related to the country's rural development strategy and to the overall project's objectives.

(b) Size: Despite the fact that large projects enable us to reach large numbers of people, there are important trade-offs between the number of project beneficiaries and project performance. It has been stated that "medium size" projects perform better than the large size projects because they are easier to manage and it is easier to commit government funds. The main objective will be to determine which are the most relevant variables that determine the optimum size of a project.

(c) Sequence of Components: The sequencing of different components (i.e. activities) within a project greatly affect the overall performance of such a project. Sequencing of project activities has somehow to follow an "optional" pattern. This pattern has to respond to previously defined project objectives. The basic objective of this study would be to provide some guidelines and maybe a methodology to deal with such problems.

<u>First Responsibility:</u>	Alfredo Sfeir-Younis
<u>Participation:</u>	Jose Olivares (OED)
<u>Consultants:</u>	Reiner Thoss
<u>Timing:</u> Start	March 1980
First Draft	March 1981
Final Draft	August 1981
<u>Output:</u> Set of Guidelines	

MONITORING AND EVALUATION IN PROJECTS

This study will first, synthesise and elaborate a generalized methodology for monitoring and evaluation in projects, and subsequently refine this methodology to meet the needs and conditions for such activity in different types of projects. These may include all kinds of projects and project components found in the rural sector. The emphasis of this study is on the methodological rather than the operational aspects of monitoring and evaluation, but its aims are to improve current practice.

Responsibility: P. Scandizzo/P. Abraham

Participation: A. Sfeir-Younis
Michael Cernea
Guido Deboeck

Consultants: Not specified

Timing: Start - October 1, 1978
Interim Outputs - -
Final Report - June 30, 1980

Output: Interim Guidelines
Staff Working Paper

ANALYSIS OF RISK IN PROJECTS

The purpose of this study is to develop a methodology for the analysis of risk in projects. This will include taking account of: (i) risk effects arising from lack of robustness of the farm models, (ii) difficulties in quantifying the parameters in the project analysis, and (iii) variability in physical performance of the project due to uncontrolled and unexpected events. The study will involve a review of current knowledge in the subject area, the synthesis of a methodological approach, and adjusting this methodology for use in an operational context.

<u>Responsibility:</u>			Pasquale Scandizzo
<u>Participation:</u>			Bill Cuddihy Gordon Temple
<u>Consultants:</u>			Jock Anderson, UNE (Australia)
<u>Timing:</u>	Start	-	October 1, 1977
	First Draft	-	February 28, 1978
	Final Draft	-	December 31, 1978
<u>Output:</u>	Staff Working Paper Central Projects Memorandum		

FIELD ASSESSMENT OF FINANCIAL VIABILITY

The aim of this task is to assemble a set of guidelines for the analysis of project entities, government agencies/parastatals, cooperatives, commercial banks and other financial intermediaries involved in projects as managers or on-lenders of Bank funds. The guidelines will be oriented towards the use of financial analysis to evaluate the liquidity and efficiency of intermediaries, and to diagnose the financial constraints facing the banking system or class of intermediary concerned. These guidelines should enable financial analysis and agricultural credit specialists in project divisions to take a more systematic analytical approach to such institutions in project preparation and appraisal.

<u>Responsibility:</u>	J.D. Von Pischke
<u>Consultants:</u>	none
<u>Timing:</u> Start	July 15, 1978
First Draft	
Final Draft	August 1979
<u>Output:</u> Staff Working Paper	

MULTI-OBJECTIVE CRITERIA FOR PROJECT EVALUATION

Ex-post evaluation activities place emphasis on the re-evaluation of the Internal Rate of Return (IRR) of a project. Despite the fact that many other elements are considered in the analysis, a new methodology should be proposed which considers an array of economic and social objectives, somehow related to the country's overall rural development strategy. The objective of this study will be to propose a multi-objective methodology to offer useful insights about the degree of project performance in relation to objectives such as employment, regional income and foreign exchange earnings.

First Responsibility:

Alfredo Sfeir-Younis

Participation:

Consultants:

Timing: Start

February 1979

First Output

Second Output

Third Output

Output: An Ex-post Evaluation Methodology

OFFICE MEMORANDUM

TO: Mr. Graham Donaldson, AGR Chief

DATE: August 22, 1978

FROM: Mark W. Leiserson, DEDER Chief

SUBJECT: Summary Statement on DEDER Research for the Research Advisory Panel
on Agriculture and Rural Development (RAPARD)

Attached is a brief statement on DEDER research on rural development which Mr. Yudelman asked be prepared (memorandum dated July 10, 1978) for submission to members of RAPARD prior to their meeting next month. It is largely confined to explaining the context in which past and current research activities have been developed in order to assist RAPARD members in their review of the selected research papers from this Division which were submitted to them through you earlier this month. Broader and more fundamental questions about the size and structure of future programs of Bank research on rural development will, I understand, be the subject of further discussions between CPS and DPS.

cc: Messrs. Chenery, VPD
Karaosmanoglu, VPD
Balassa, VPD
King, DEDDR
Stoutjesdijk, DEDDR
Selowsky, DEDDR
Bery, VPD

DEDER Staff

Yudelman, AGR
Christoffersen, AGR
Turnham, AGR
Duloy, DRC

Attachment

EMPLOYMENT AND RURAL DEVELOPMENT DIVISION

RESEARCH ON RURAL DEVELOPMENT, 1974-1978

INTRODUCTION

1. In reviewing the research on rural development carried out in this Division since 1974, three important factors need to be borne in mind that have influenced both the content and direction of our research efforts.

(a) The Division was formed after the Bank reorganization in 1973 as the successor to the previous Agriculture and Rural Development Division. As a consequence, some of our research effort has been in the nature of unfinished projects left over from the earlier division.

(b) The reorganization assigned the responsibilities for research on 'agriculture' to the Agricultural and Rural Development Department in CPS. This Division was also given in addition to its work on employment, the responsibility of carrying out research and providing operational support on rural development in close cooperation with the Rural Development Division of the Agriculture and Rural Development Department.

(c) The Division has had no more than two full-time professionals at any one time with primary interests and background in rural development (as distinct from employment) in the four years the Division has been in existence. And, like all Division staff a great portion of their time has had to be devoted to operational support and policy work.

2. These factors have forced the Division (a) to give priority to the unfinished work inherited from the earlier division, (b) to define its research to fit with the limited resources available, and (c) to exploit the overlap as far as possible between research and operational support and between research on employment and rural development. In this context the role of the Division in research and other activities in 'rural development' has been supplemental to and collaborative with work of other Departments. What follows is a brief description of our research efforts since 1974 on rural development under three broad categories: (1) research left over from the earlier division, (2) research started by the present division and completed or still in progress, and (3) future research directions now under consideration.

RESEARCH CARRIED OVER

3. Four research projects that were initiated before the creation of this Division have all been completed.

(a) African Rural Development Study

The purpose of this study was to assess the importance of specific institutional, design, and administrative constraints in the design of rural

development projects in the African context. The study drew on detailed evidence from some seventeen rural development programs in sub-Saharan Africa. The study resulted in over 14 papers (Divisional Papers 1-14) that reviewed field project experience in seven African countries in an operational context. The findings from these studies were summarized in a book (Mrs. Uma Lele: The Design of Rural Development: Lessons from Africa). The entire study was geared to understanding rural development problems in a project context and has been widely used as a source book.

(b) Latin American Land Reform Study

This study was designed to analyze the problems of agrarian structure in Latin America--the constraints imposed by the agrarian structures and the progress made through land reforms in removing these constraints in four Latin American countries--Chile, Bolivia, Peru and Mexico. Some twelve background papers were completed for the study (Divisional Papers 15-26) and a final report has been issued as Bank Staff Working Paper No. 275, April 1978.

(c) Pakistan Mechanization Study

This study examined the major consequences of the introduction of tractor technology to farms in Pakistan. The assessment related particularly to the use and effects of World Bank lending for this purpose. The study arose inter alia from a growing concern about the possible adverse social effects of farm mechanization, particularly on employment (see "The Consequences of Farm Tractors in Pakistan," Bank Staff Working Paper No. 210, February 1975).

(d) Study of Public Works Programs

This study looked at 24 public works programs in fourteen countries with a view to evaluating the potential of public works (rural and urban) as instruments for absorbing unemployment, constructing infrastructure and improving the living standards of low income groups. Its findings (summarized in "Public Works Programs in Developing Countries: A Comparative Analysis," Bank Staff Working Paper No. 224, February 1976) were used as a basis for two papers analyzing the policy issues involved in Bank financing of such programs in general and as components of "new style" rural development projects ("Bank Financing of Rural Public Works," March 24, 1976 and "Rural Public Works and the Bank: Background Analysis," March 24, 1976).

RESEARCH COMPLETED OR IN PROGRESS

4. A main element of the Division's research strategy has been to exploit the complementarity between our work on employment and on rural development. One result has been the emphasis given to research on how rural labor markets work and how technology and labor allocation decisions by households affect their income-employment opportunities, both on and off the farm. Five studies in this area have been carried out. These include:

(a) Farm Size Factor Productivity, and Technical Change
in Developing Countries

This study by R.A. Berry and W.R. Cline was a joint research project with the International Labour Office, Geneva. It examined the question of agricultural productivity and rural equity in a number of developing countries. Policies such as land reform and agricultural development strategies emphasizing small farm production were specifically addressed. It was found that both sets of policies would not only lead to greater equity, but would also be more "efficient" in the sense of leading to higher total output levels. The final report is to be published by Johns Hopkins University Press as "Agrarian Structure and Productivity in Developing Countries."

(b) The Analytics of Change in Rural Communities
(RPO 671-17 - Jointly with DRC)

The Division's contribution to this larger study developed a methodology for looking at the response of rural economic agents--who are both households and firms--to employment opportunities that result from rural development projects carried out in the communities where they reside. A theoretical model that integrates farm-household decisions with respect to both production and consumption was developed and empirically applied to data from a Bank project in the Muda River Valley in N.W. Malaysia. The findings from this study confirm that economic response to price, wage and technology choices are affected profoundly by the joint nature of the farm-household. Several divisional papers (Nos. 34, 35 and 43) and a forthcoming Bank Occasional Paper (An Econometric Model of An Agricultural Household, by H.N. Barnum and L. Squire) describe this work.

(c) Structure of Rural Employment, Income and Labor Markets
(RPO 671-30)

This project seeks to extend the methodology developed above to multicrop environments with the added purpose of quantifying the extent to which Bank agricultural projects benefit landless or near-landless households who depend on wage employment as their main source of income. Since an understanding of the operation of labor markets is critical to evaluating the changing structure of wage opportunities, the first phase of the research consisted of a critical review of the large body of existing Indian empirical studies on this topic as well as a comparative analysis of the impact of technological change on labor demand and supply and on wage rates for selected areas in India. This phase is complete and two reports have been issued and published (K. Bardhan, "Rural Employment, Wages, and Labor Markets in India: A Survey of Research" E.P.W., Vol. XII, Nos. 26, 27 and 28, 1977, and K. Bardhan, "Rural Employment and Wages with Agricultural Growth in India: Some Inter-temporal and Cross-Section Analyses," Division Paper No. 38). A second phase involves the use of farm-household survey data from Korea and data from three Bank projects in Northern Nigeria. The object of these studies is to estimate household labor demand and supply curves in the context of a model which incorporates both consumption and production behavior of rural decision units. The Korean work is being done jointly with the Korea Rural Economics Institute, while the Nigerian study is being done in cooperation with the Northern Nigerian Projects Monitoring and Evaluation Unit.

(d) Appropriate Technologies in Peasant Farming Systems in Tanzania

The integrated nature of firm-household decisions has a bearing on the choice of technology and hence employment and income distribution in peasant agriculture. This study, carried out as part of a Basic Economic Mission to Tanzania, was designed to determine the efficacy of alternative agricultural technologies in an area (Sukumaland) where subsistence farms predominate. It was found that in such an environment oxen technologies tend to be most efficient and robustly so, even in the case where peasant holdings are organized on a village basis, as under the policy of organizing the Ujamma villages in Tanzania (see "Appropriate Technologies In Tanzanian Agriculture: Some Empirical and Policy Considerations").

(e) Non-Farm Employment in Rural Areas

As part of its policy related activity the Division undertook an exploratory study of the importance of non-farm employment activities in rural area and their significance for the design of rural development projects. Case studies on individual country experience were reported in Division Papers Nos. 31, 32 and a final report analyzing some of the implications for Bank work has been published as a policy issues paper (Rural Enterprise and Non-Farm Employment, January 1978).

5. Finally, two additional activities have also contributed to the Bank's work on rural development--a short review of the problems and prospects for monitoring and evaluating rural development projects (see Division Paper No. 20)--was part of an early Division initiative to stimulate a larger Bank-wide effort to develop systematic methods of dealing with the difficult and important issues that are involved in such an undertaking. The second activity involved the preparation of the background materials on agriculture and rural development for the first World Development Report. One of the background papers emerging from this work--on the Problems and Prospects of Small Farmers and the Landless in South Asia--is currently being developed into a monograph surveying and analyzing the large book of literature on these subjects in South Asia.

6. As is apparent from this brief review of Division activities, the allocation of extremely limited Division resources to research on rural development has been carried out with two main considerations in mind (a) to exploit the complementarity between employment and rural development research by focusing on problems of rural employment and labor markets and an understanding of how they work to benefit not only the landed but also landless households, and (b) to concentrate on acquiring a clear understanding of how rural households, farm and non-farm, make decisions regarding the allocation of their resources--land, capital and particularly labor--in a context where farm-enterprise-firm decisions regarding production cannot be separated from 'family-household' decisions about consumption and allocation of labor. These themes have been a consistent element both in terms of the research proposals (RPOs 671-30 and 671-17) and other operational or support work.

FUTURE RESEARCH POSSIBILITIES

7. The present resource constraints permit the Division to pursue only a limited program of research. The current research program, which follows the directions laid down by earlier work and seeks to build on it, includes two related studies that will form the basis for the development of further work.

(a) Factor Markets in Rural India

This study extends our earlier interest on rural labor markets to capital and credit markets, and our work on the theory of agricultural households. An important aspect of the demand, and supply of credit, is household savings. Bhalla has completed revision on a paper written for the Public and Private Finance Division, "Aspects of Savings Behavior in Rural India." (This has resulted in two articles: "Role of Sources of Income and Investment Opportunities in Rural Savings," forthcoming, Journal of Development Economics, and "The Measurement of Permanent Income and its Application to Savings Behavior," under consideration, Journal of Political Economy.) Little analysis exists on the role of credit in joint firm-household (cultivator) decisions. The demand for capital and credit cannot be treated in a partial framework, as it involves investment-saving-wealth relationships and the cost and quantity of different sources of credit. Some initial work on estimating the demand for credit has been done previously by Singh in India and Brazil. Bhalla is presently working on a theoretical model that incorporates these interdependencies. Data from the National Council of Applied Economic Survey for 3,000 rural households in India will be used for empirical analysis. A more extensive research proposal in this area may be prepared after the preliminary methodological and empirical results from this study are available.

(b) Small Farmers and the Landless in South Asia

Growing out of the background work for the World Development Report a monograph is being prepared to review and analyze systematically the vast body of literature on the problems of small farmers and the landless in India, Bangladesh and Pakistan. It is hoped that this effort will be successful in bringing to the attention of economists abroad, particularly those working in international agencies, the results of this vast research.

The possibilities that are being considered to follow completion of this survey activity include:

- (i) A Comparative Study of the Impact of Agricultural Growth on Employment and Productivity in India
(Jointly with DRC)

A first phase of this proposal has already been funded and is being carried out in DRC to develop a methodology to study the impact of agricultural growth on rural employment and poverty in India in three separate institutional--capitalistic (Punjab), feudal (Bihar) and semi-feudal (Tamil Nadu or

OFFICE MEMORANDUM

TO: Mr. Leif Christoffersen, AGRDR

DATE: August 29, 1978

FROM: Mark W. Leiserson, ^{ML} DEDER ChiefSUBJECT: Meeting of Research Panel on Agriculture
and Rural Development (RAPARD)

1. With reference to your memorandum of August 22, I have asked I.J. Singh to represent this Division in the scheduled meeting with RAPARD. In the absence of Ben King, Singh will be joined by Ardy Stoutjesdijk on behalf of DED. Both will be available any time on September 7 or 8 for an introductory meeting.

2. As we discussed over the phone it would be helpful if you could let us know precisely what was communicated to members of RAPARD regarding our work program when the selection from the materials we supplied to Graham Donaldson was forwarded to them. In the list accompanying your memo, three DPS research projects mistakenly appear as originating from CPS, the issues paper on Rural Enterprise and Non-Farm Employment is listed incorrectly as an output from the RPO on Public Works, while the issues and background papers on rural public works are omitted, and the papers resulting from our contribution to the RPO on the Analytics of Rural Change are not mentioned. We have earlier sent to you a summary statement on the work on rural development by this Division and I am attaching to this note for use by RAPARD members a complete list of publications, reports and papers.

3. Ben King has also asked that I call to your attention the fact that other divisions of the Development Economics Department have been or are engaged in studies on one or another aspect of rural development. The Public Finance Division has carried out a number of small studies on rural savings behavior and rural financial institutions and a number of research projects in the Population and Human Resources Division might easily have been classified as research on rural development. The latter would include RPO 670-99, Economic Aspects of Household Fertility Behavior and Labor Supply in Northeast Brazil; RPO 671-02, Population Growth and Rural Poverty; and RPO 671-49, Education and Rural Development in Nepal and Thailand. However, these projects presumably were presented for review by the external advisory panels on population and education.

cc: Messrs. King, DEDDR
Stoutjesdijk, DEDDR
I.J. Singh, DEDER

Balassa, VPD
Bery, VPD
Duloy, DRC

Donaldson, AGR

Attachment

LIST OF SELECTED PUBLICATIONS AND PAPERS
PERTAINING TO RURAL DEVELOPMENT FOR
SUBMISSION TO RAPARD
(JULY 1974 - SEPTEMBER 1978)

Employment and Rural Development Division
Development Economics Department
World Bank
August 29, 1978

I. BOOKS

1. Berry, R.A. and W.R. Cline. Agrarian Structure and Productivity in Developing Countries, Baltimore: Johns Hopkins University Press (In manuscript - forthcoming).
2. Lele, U. The Design of Rural Development: Lessons from Africa, Baltimore and London: Published for the World Bank by the Johns Hopkins University Press, 1975.
3. Sabot, R.H. Ed. Essays on Migration and the Labor Market in Developing Countries (Proceedings of a Conference held by the World Bank), Baltimore: Johns Hopkins University Press (In manuscript - forthcoming).

II. ARTICLES AND OCCASIONAL PAPERS

1. Barnum, H. and L. Squire. An Econometric Model of the Agricultural Household, World Bank Staff Occasional Paper, Baltimore: Johns Hopkins University Press (In manuscript - forthcoming).
2. Barnum, H. and L. Squire. "Technology and Relative Economic Efficiency," Oxford Economic Paper, July 1978.
3. Barnum, H. and L. Squire. "An Econometric Application of the Theory of the Farm-Household," Journal of Development Economics (forthcoming).
4. Bhalla, S. "Measurement Error and the Permanent Income Hypothesis: Evidence from Rural India." American Economic Review (forthcoming March 1979).
5. I.J. Singh and C.Y. Ahn. "A Dynamic Multi-Commodity Model of the Agricultural Sector: A Regional Application in Southern Brazil," European Economic Review (forthcoming).
6. Ahn, C.Y. and I.J. Singh. "Comparative Policy Simulations: Agricultural Development in Southern Brazil to 1985," in R.H. Day and A. Cigno (Eds.) Modelling Economic Change: The Recursive Programming Approach, Amsterdam: North Holland Publishing Co. (forthcoming).
7. Ong, M.L., D.W. Adams and I.J. Singh. "Voluntary Rural Saving Capacities in Taiwan 1900-70," American Journal of Agricultural Economics, Vol. 58, No. 3, August 1976.
8. Bardhan, K. "Rural Employment, Wages and Labor Markets in India: A Survey of Research," Economic and Political Weekly, Vol. XII, Nos. 26, 27, and 28 (in three parts), 1977.

III. WORKING PAPERS

1. Bose, Swadesh. "Some Aspects of Unskilled Labor Markets in Civil Construction in India: Observations Based on Field Investigations," Bank Staff Working Paper No. 223, February 1976.
2. Burki, S.J.; Davies, D.G.; Hook, R.M. and Thomas, J.W. (edited by R.V. Weaving), "Public Works Programs in Developing Countries: A Comparative Analysis," Bank Staff Working Paper No. 224, February 1976.
3. Eckstein, S.; Donald, G.; Horton, D. and Carroll, T., "Land Reform in Latin America: Bolivia, Chile, Mexico, Peru and Venezuela," Bank Staff Working Paper No. 275, Washington, D.C., The World Bank, April 1978.
4. Weaving, R. "African Experiences with Rural Development: A Digest Report on the African Rural Development Study," Bank Staff Working Paper No. 195, January 1975.

IV. POLICY AND ISSUES PAPERS

1. Anderson, D. "Issues in the Monitoring and Evaluation of Rural Development Projects: A Progress Report," December 17, 1975 (Draft).
2. Development Economics Department. "Issues in Bank Financing of Rural Public Works," Washington, D.C., March 24, 1976.
3. Development Economics Department. "Rural Public Works and the Bank: Background Analysis," Washington, D.C., March 24, 1976.
4. Development Economics Department. Development Issues in Rural Non-Farm Employment, Report No. 1577, Washington, D.C., The World Bank, April 15, 1977.
5. IBRD, Land Reform, World Bank Paper - Rural Development Series, July 1974.
6. Krishna, Raj. "Land Reform and the Objectives of Policy," January 1974. Draft Chapters of Land Reform, World Bank Paper - Rural Development Series, July 1974.
7. Krishna, Raj. "The Determination of the Optimum Activity-Mix of Rural Development Projects," First Draft of a Working Paper, July 1974.

V. DIVISION PAPERS

1. Lele, Uma J. "The Design of Rural Development: An Analysis of Programs and Projects in Africa," Studies in Employment and Rural Development No. 1, Washington, D.C., Employment and Rural Development Division, Development Economics Department, IBRD, September 1974.
2. Belloncle, G. and Gentil, D. "French Technical Assistance in Cameroon: A Review of the Zones d'Action Prioritaires Integrees (ZAPI) and the Societe du Developpement du Nkam (SODENKAM), No. 2, September 1974 (in four volumes).
3. Tecle, T. "Rural Development Programs in Ethiopia: A Review of the Chilalo Agricultural Development Unit, The Wolamo Agricultural Development Unit and the Minimum Package Program," No. 3, September 1974.
4. Ruthenberg, H.; Thimm, H. and Jhanke, H. "Range Development in Kenya: A Review of Commercial, Company, Individual and Group Ranches," No. 4, September 1974.
5. von Pischke, J.D. "Small Farmer Credit in Kenya: A Review of Major Credit Schemes," No. 5, September 1974.
6. Sullivan, D. "Smallholder Tea Project in Kenya: A Review of Kenya Tea Development Authority," No. 6, September 1974.
7. Bedi, N. "Rural Development in Kenya: A Review of Special Rural Development Program," No. 7, September 1974.
8. Mbithi, P. and Barnes, C. "Land Settlement in Kenya: A Review of the Squatter Problem," No. 8, September 1974.
9. Kinsey, B.H. "Rural Development in Malawi: A Review of Lilongwe Land Development Program," No. 9, September 1974.
10. Anderson, G. "French Technical Assistance Mali: A Review of Groundnut Operation and Cotton Scheme," No. 10, September 1974.
11. Turner, H. "Small-Scale Rural Industries in Nigeria: A Review of Industrial Development Centers," No. 11, September 1974.
12. Agarwal, M. and Linsenmeyer, D. "Smallholder Tobacco Development in Tanzania: A Review of Urambo and Tumbi Schemes," No. 2, September 1974.
13. Collinson, M. "Cotton Development in Tanzania: A Review of Cotton Program in Sukumaland," No. 13, September 1974.

V. DIVISION PAPERS (Continued)

14. Abraham, P. and Robinson, F. "Rural Development in Tanzania: A Review of Ujamaa," No. 14, September 1974.
15. Cifuentes, Eduardo. "Land Reform in Chile, No. 15, June 1975.
16. Dorsey, Jeff. "Bolivia Country Report," No. 16, June 1975.
17. Dorsey, Jeff. "A Case Study of Ex-Hacienda Toralapa in the Tiraque Region of the Upper Cochabamba Valley," No. 17, June 1975.
18. Dorsey, Jeff. "A Case Study of the Lower Cochabamba Valley, Bolivia," No. 18, June 1975.
19. Eckstein, Shlomo. "Lessons from the Mexican Experience in Land Reform," No. 19, June 1975.
20. Eckstein, Shlomo. "Mexico Case Study: Comparative Analysis of Economic Performance of Tenure Groups in the Laguna Basin," No. 20, June 1975.
21. Eckstein, Shlomo and Carroll, Thomas. "Peasant Cooperation in Land Reform Programs: Some Latin American Experiences," No. 21, June 1975.
22. Horton, Douglas E. "Peru Case Study Volume," No. 22, June 1975.
23. Horton, Douglas E. "Land Reform and Group Farming in Peru," No. 23, June 1975.
24. Horton, Douglas E. "Land Reform and Reform Enterprises in Peru," No. 24, June 1975.
25. Stanfield, David and Others. "The Impact of Agrarian Reform on Chile's Large Farm Sector," No. 25, June 1975.
26. Stanfield, David and Smith, Stephen. "Asentamiento Management and Productivity Changes in Chile's Central Valley," No. 26, June 1975.
27. Gregory, Peter. "The Impact of Institutional Factors on Urban Labor Markets," No. 27, June 1975.
28. Anderson, Dennis. "Fluctuations of Maize and Groundnut Yields in the Lilongwe Land Development Program," No. 28, June 1975.
29. Dhamija, J. "Non-Farm Activities in Rural Areas and Towns: The Lessons and Experiences of Iran," No. 31, July 1976.
30. Ho, S.P.S. "The Rural Non-Farm Sector in Taiwan," No. 32, September 1976.

V. DIVISION PAPERS (Continued)

31. Singh, I.J. "A Note on the Economics of Agricultural Mechanization," No. 33, November 1976.
32. Barnum, H.N. and Squire, L. "Aggregation, Labor Heterogeneity, and Agricultural Production Functions," No. 35, December 1976.
33. Kaneda, H. "Economic Implications of Farm Size Distribution, Cropping Patterns and Income Distribution in Bihar's Agriculture," No. 36, January 1977.
34. Bardhan, K. "Rural Employment and Wages with Agricultural Growth in India: Some Intertemporal and Cross-Sectional Analyses, No. 38, March 1977.
35. Goldman, R.H. and Squire, L. "Technical Change, Labor Use and Income Distribution in the Muda Irrigation Project," No. 43, Washington, D.C., December 1977.
36. I.J. Singh. "Rural Works Programs in South Asia: A Note," No. 48, Washington, D.C., August 1978.
37. I.J. Singh, "Small Farmers and the Landless in South Asia: Problems and Prospects," No. 47, Washington, D.C., August 1978.

VI. RESEARCH REPORTS AND CONTRIBUTION TO BANK REPORTS

1. Thomas, J.W.; Burki, S.J.; Davies, D.G. and Hook, R.M. "Employment and Development: A Comparative Analysis of the Role of Public Works Programs - A Report to the World Bank," Cambridge, Mass., Harvard Institute for International Development, Harvard University, April 1975.
2. Squire, L. "Allocation of Time in Rural Households; Z Goods, the Income-Leisure Trade Off and Seasonality," September 1975.
3. Squire, L. "The Distribution of Income Benefits in the Muda River Irrigation Project," November 4, 1975.
4. Barnum, H.N. and Squire, L. "An Economic Test of the Theory of the Farm Household," October 1976.
5. Singh, I.J. "Appropriate Technologies in Tanzanian Agriculture: Some Empirical and Policy Considerations," Report No. 1616-TA, Tanzania Basic Economic Report: Annex VII, Eastern Africa Country Program I, Washington, D.C., December 1977.

VII. OTHERS

1. Dhamija, J. "Role of Institutional Support in the Rural Non-Farm Sector," September 1976.
2. Goldman, R.H. and Squire, L. "Household Labor Utilization," September 1976.
3. Goldman, R.H. and Squire, L. "Short Run, Direct Employment, Price and Income Effects of the Muda Irrigation Scheme," Washington, D.C., DEDER, July 1977 (Draft).
4. Ahn, C.Y. and Singh, I.J. "Dynamics of Farm Level Income Distribution: Methodology and Application," Washington, D.C., DEDER, August 1977. Paper prepared for the Seminar on 'Renewable Resource Planning and Development', Honolulu, September 4-14, 1977.
5. Anderson, D. and Leiserson, M.W. "Non-Farm Rural Employment in Developing Countries," Washington, D.C., DEDER, September 1977. Paper presented at the Joint Annual Meeting of the African Studies Association and the Latin American Studies Association, Houston, Texas, November 2-5, 1977.
6. Singh, I.J. and Squire, L. "A Model of the Agricultural Household: Some Implications for Nutrition Policies in Rural Areas." Paper presented at the Conference on The Economics of Nutrition Oriented Food Policies and Programs, Bellagio, Italy, August 1977.
7. Bhalla, S. "The Measurement of Permanent Income and Its Application to Savings Behavior," March 1978.

August 18, 1978

RESEARCH ON AGRICULTURE AND RURAL DEVELOPMENT
IN THE
DEVELOPMENT RESEARCH CENTER

1. Objectives of the Development Research Center

A brief introductory view of the Development Research Center (DRC) can be obtained from the attached "The World Bank's Development Research Center."^{1/} This publication, dated August 1975, provides a balanced statement of the DRC's functions, as we viewed them three years ago.

In particular, the objectives of the DRC are stated, at least implicitly, on page 3, where the Bank's research is characterized as:

- "• studies to improve understanding of economic development and the role of the Bank and member countries in furthering it;
- efforts to formulate, refine and/or apply analytical tools to decision-making in the development context.

While the DRC undertakes both types of research, somewhat more emphasis is placed on the latter."

Currently, it would probably be more accurate to say that "the DRC places about equal weight on each of these areas of work."

Economic development involves analysis of sectors, intersectoral relationships, international trade opportunities. Evaluation of strategies for development (synthesis) depends on goals (time frame for alleviation of poverty, rate of growth of GNP, distribution, etc.) and understanding of sectoral and intersectoral relationships. Given the deficiencies of industrialization strategies coupled with import substitution strategies, etc.

^{1/} Additional copies available from the DRC.

in alleviating rural poverty, attention has been directed towards a better understanding of intersectoral relationships. The research strategy has been to concentrate initially on the ARD area, while also reviewing dualistic models of development, in preparation for more extensive research into economy-wide development models.

The DRC, unlike other research producing units of the Bank has not formally had responsibility for work in particular sectors. Whilst the DRC has had a substantial Agriculture & Rural Development (ARD) research effort over the last five years, it has been motivated by our desire to improve our understanding of economic development rather than because of any direct organizational tie to ARD as a subject matter area.

Given the importance of Bank lending in the ARD area, and given the weight of the agricultural sector in world poverty problems, it is to be expected that the DRC would find a number of important researchable questions in the ARD area, and this has indeed been the case. Given the importance, not to say dominance of ARD in many of the Bank's concerns, the DRC's involvement with ARD is likely to continue.

2. Historical Perspective

The past pattern of ARD research in DRC may be characterized as having one major theme (agricultural sector models, inspired by the CHAC model of Mexican agriculture), one minor theme (the interrelationship of ARD and Income Distribution), with variations (described below). The DRC has not yet done extensive work on the relationship between the sector

and the economy as a whole, although this is perceived as important for the future work program.^{1/}

2.1 The CHAC Family of Agricultural Sector Models

The DRC's CHAC model of Mexican agriculture (RPO 670-16) broke new ground on a number of counts:

- i) endogenized prices and quantities in the context of a linear programming model
- ii) regional disaggregation, with labor migration;
- iii) a carefully researched farm level data base from which the model permits the drawing of sector-wide indications; and
- iv) institutionalization of the model within the Mexican policy-making leadership.

The synergism of simultaneously addressing these four issues is even more apparent today than it was then. Two problems which were recognized at the time, and are still only partially resolved, are the high cost of model construction, and their relatively long gestation period.

One great attraction of this methodology is that it permits the simultaneous study of many components of development. To date the DRC has tended to use this feature to study interrelationships within the agricultural sector. Future work will likely extend this to study the links between agriculture and the rest of the economy.

^{1/} It has done some work in this area and has completed a review of dualistic models of development as a background for future research.

Work using the CHAC methodology,^{1/} with variations, and applicable to ARD includes:

- i) NE Brazil (RPO 670-73). This study looks at the structural problem of low agricultural incomes and productivity in NE Brazil, a chronically depressed region. Methodologically, the study has broken new ground with a very extensive farm survey, specifically designed to yield the types of agronomic/engineering data needed for CHAC-type model construction.

It also breaks new ground in capturing important features of the agrarian structure, viz., the coexistence of traditional fazendas, plantations, commercial farms, sharecroppers and landless laborers.

The study shows both the potential for, and limitations of, a land reform; and highlights the crucial importance of the marketing and demand side in the planning of large ARD projects--increased output by a significant group of suppliers may mean lower gross income.

^{1/} More strictly a mathematical programming framework to bring together intra-sectorial relationships.

- ii) Zambia (RPO 671-29). This study was motivated by the Bank's interest in issues of agricultural price policy and trade as they affect the East African countries of Zambia, Tanzania, and Kenya. It broke new methodological ground in trying to build the model on the basis of secondary data, and with the minimum of in-country experience. The study has cost substantially less than other CHAC-type models. However, there were deficiencies identified in the secondary data, and the model was not "institutionalized" within Zambia. This study is in the write-up phase, and interesting price and other policy suggestions will emerge. It is not yet clear what impact these will have.
- iii) Central America.^{1/} A prototype model (MOCA) was constructed by DRC and SIECA, of potential trade in agricultural crops among the five countries of the Central American Common Market. Secondary data, from a well-designed FAO study of farm production relations in the five countries was used. This data was, however, carefully reviewed, and in any case no more than demonstration value was claimed for the results obtained. This model broke new ground in introducing inter-country trade and trade barriers. Given that the structure

^{1/} See Bank Staff Working Paper 276.

of the model promised useful policy results, responsibility for it was assumed by SIECA, who are in the process of extending and revising it. This is another model which has been successfully passed for adoption to another institution. How influential it will eventually be in the agricultural trade policy of the Central American Common Market is, at this stage, still an open question.

- iv) MUDA (RPO 671-17). This study refers to the impact of an irrigation project on a rice mono-culture region in Malaysia. The primary motivation was to attempt an ex-post analysis of the secondary effects of the project, and to review its impact on income distribution in the region. Two models were constructed. The first was a model of padi production, disaggregated by farm type, to evaluate the direct impact of the project upon the padi sector, by correcting for the effects of other changes, such as of prices and varieties. The second was a social accounting matrix (SAM) model of the region as a whole, used to evaluate the secondary benefits of the project and why and to whom they accrue. This study is scheduled for completion in December 1978. Already, however, two interesting results have emerged.

First, the secondary effects of the project were due mainly to the increased consumption expenditures of project farmers, rather than due to their increased demands for locally-produced farm inputs. Second, in this region

secondary incomes amounted to almost \$1 for each \$1 of primary incomes generated by the project. Finally, the results of this study are currently being used in the evaluation of a second stage of the irrigation project.

All of the above projects are completed, or very close to completion, and represent a substantial bundle of DRC resources which could be redirected over the next year, in the event that a major new research thrust seems desirable for the DRC. The following three studies are again in the CHAC tradition, but are still one or two years from completion.

- v) Indus (RPO 671-45). The initiative for this study came from the South Asia Projects Department, motivated by a concern for the income distributional and system-wide impact of a very large investment program. The project represents the 33 million acres of the Indus irrigated flood plain as 53 interconnected hydrological "polygons." The interrelationships of surface and tubewell irrigation on agricultural production the raising/lowering of the water table and its implications for drainage and "mining," and fresh/saline subsoil water interfaces are being modelled so as to allow assessment of optimal investment strategies. This is a very large problem area, addressed by a set of models, which promises to yield system-wide insights which were not previously possible. The study is being conducted with the close cooperation of WAPDA (Pakistan's Water and Power Development Authority)

and the Bank's South Asia Projects Department. Both institutions hope to use the model for investment planning, and project selection. This is perhaps the best institutionalized of the CHAC derived models.

- vi) Egypt. This study is a derivative of the Indus work, requested by the Egyptian authorities and the Bank operational staff involved. The model which is being constructed is expected to serve much the same purpose for the Egyptian Master Water Plan as the previous study will for WAPDA. The hydrological configuration of the Egyptian model is expected to be considerably simpler than that of the Indus. Nevertheless, this is again a very large problem. Increased efficiency in the allocation of Nile waters and the insights that the model will give on price policy are expected to have a high pay-off. An initial model showed that shifting from controlled prices to world prices to farmers, could double the value added, evaluated at world prices. This initial result will need to be extended to other areas, and also qualified in the light of the imperfectly elastic world demand for cotton, which is Egypt's major agricultural export.
- vii) Algeria. Here a UNDP financed project to produce an agricultural sector model, predominantly for price policy purposes, is being managed by the EMENA region. A DRC staff member is acting as a "consultant" to the line manager for this project.

All of the above agricultural sector studies have represented the application of mathematical programming in different geographical locations, to different types of problems, and with their own methodological twists.

Two other important extensions of the CHAC-type approach have been made.

- viii) Risk (RPO 671-43). This has expanded our modelling of farmer decision-making behavior from a purely "profit maximizing" motivation, to include risk averse behavior. The work of Hazell has led not only to incorporation of risk averse behavior within the class of CHAC-style models, but also in individual farm modelling. In this context many traditional technologies, such as intercropping (two or more crops growing in the same area at the same time), appear much more rational than the mono-cultures, which would frequently maximize expected income (or certainly would maximize income in a good year).

- ix) Multi-Level Programming (Non-RPO). The current state of the art with respect to CHAC-type sector models is that they are used in a simulation mode to explore the likely impacts of pre-specified policy alternatives. Clearly another, more sophisticated, mode of using these models would be possible. In this mode the researcher would respond to the question: If these are the policy objectives, and

if we accept the validity of the sector model, what then are the optimum levels for the policy variables? In this mode, rather than explore pre-specified policy alternatives, the researcher would suggest the levels of the policy instruments which would best meet the policymakers' objectives. This approach poses significant computational problems, but a demonstration of the approach has been completed for an area in Mexico (WP 258).

Despite having five models in various stages of completion, there are definite difficulties with our current methodology. These concern what to model, and how to model it.

On the question of what to model, we hope to improve our understanding of economic processes. These include issues of the relationships between economic sectors, the accumulation of sectorial surpluses and their investment, the operation of imperfect markets, and role of institutions in development. Many of these relationships cannot usefully be incorporated in the types of sector model built to date, but the insights obtained from our sectorial studies nevertheless emphasize the vital importance of these issues of economic theory.

On the question of how to model, we have the problem that these models, even when they grow to 20,000 equations and 50,000 activities still represent custom-made models. Advanced data generation and report writing ideas are used, but each application is tailored to the needs of the particular study.

Support software cannot yet be transferred directly from one model to the next. No common terminology or coding conventions are used. While progress has been made in systematizing the data base for these models and making it available for other purposes, there is still a big gap between this and defining, let alone implementing, a systematic data bank of agronomic and technical data. The result is that these models are very demanding of professional time, and difficult to complete in the operational time frame of line managers. Nevertheless, there is excess demand for work from the DRC of this type. This is in spite of the fact that, in some instances, we have been less than fully successful in establishing a constructive model builder/model user relationship. Partly this has been due to delays in producing results.

From the software viewpoint the DRC is making a major investment in GAMS (Generalized Algebraic Modelling System) which is designed to allow the model builder to go directly and rapidly from the model's algebra to the required reports. This promises to greatly facilitate this dimension of CHAC-style model generation.

Parallel with the series of RPO's^{1/} dealing with sectoral and investment project issues using methodologies derived from CHAC, there have been a number of smaller studies carried out using DRC staff and budget resources. These studies have focussed mainly on income distribution, poverty-related and institutional issues. They have culminated in the

^{1/} RPO's are Research Committee-approved projects, which have a formal proposal, work program, and budget.

first phase of an RPO (671-62), which is intended to open up some new directions of DRC research in the ARD area.

The studies referred to above have all been published, so that only very brief accounts of them will be given here.

The starting point for a departure from previous DRC work was the Center's concern with distributional issues, and particularly insofar as they relate to agricultural policies, which led to its involvement in writing Redistribution With Growth. Some of the issues posed in that volume were followed up by subsequent studies. The first of these was upon the impact of agricultural pricing policy and its distributional effects, a study carried out by a consultant.^{1/}

In turn, distributional issues were explored by Reutlinger and Selowsky insofar as they influence the perception of the malnutrition problem and the choice of policy options open.^{2/} These, of course, go beyond a concern only with agricultural production and the "food gap" in aggregative terms.

In a later study, Ahluwalia evaluated the effects upon the "poor" in agriculture (defined as those with incomes below a poverty line) of increases in agricultural production.^{3/} This work was conducted in the Indian context, and involved analysis both over time and across states. The time series shows that the incidence of poverty fluctuates in response

^{1/} See Mellor, John W., "Agricultural Price Policy and Income Distribution in Low Income Nations," September 1975, WP. 214.

^{2/} Reutlinger, Shlomo, and Marcelo Selowsky, Malnutrition and Poverty: Magnitude and Policy Options, The Johns Hopkins University Press, Baltimore, 1976.

^{3/} Ahluwalia, Montek S., "Rural Poverty and Agricultural Performance in India," Journal of Development Studies, April 1978.

to variations in real agricultural output per head, but there is no significant time trend. There is a statistically significant inverse relationship between rural poverty and agricultural performance for India as a whole, suggesting that agricultural growth by itself tends to reduce the incidence of poverty. The analysis for individual states presents a somewhat different picture. The inverse relationship between output per head and rural poverty is observed in several states but there is also evidence that there are processes at work which tend to increase the incidence of poverty, independently of variations in agricultural output per head.

Attention was also given to some institutional questions affecting agricultural performance, notably in a number of papers on sharecropping.^{1/} These have focussed mainly on resource allocation and income distribution under sharecropping arrangements, and the circumstances under which these arrangements might give way to other forms of lease, including self-cultivation by landlords.

These various partial studies, along with the work on Northeast Brazil (described above), have engendered greater confidence in being able to tackle some of the important institutional questions associated with rural development, without at the same time abandoning the emphasis on methodological

^{1/} Bell, Clive, "Alternative Theories of Sharecropping: Some Tests Using Evidence from Northeast India," The Journal of Development Studies, July 1977 (Reprint 48).

Bell, Clive and Pinhas Zusman, "A Bargaining Theoretic Approach to Crop-sharing Contracts," American Economic Review, September 1976 (Reprint 45).

Bell, Clive, "Production Conditions, Innovation and the Choice of Lease in Agriculture," Sankya C, Quantitative Economics, December 1976.

Kutcher, Gary P. and Pasquale Scandizzo, "A Partial Analysis of Share-tenancy Relationships in Northeast Brazil," Journal of Development Economics, December 1976 (Reprint 40).

rigor which has characterized DRC research. The various strands culminated in a proposal to work on a new RPO (671-62), "India: Impact of Agricultural Development on Employment and Poverty, Phase I."

In this study, it is recognized that while it is possible with current technology to increase the rate of growth of agricultural production in India, benefits from this increase may not reach the poor unless changes are made in the distribution of land ownership and in the institutions which serve agriculture. However, owing to the diversity of institutional contexts and infrastructures in the rural areas, policy measures will have different effects depending upon the environments in which they are undertaken. The study intends to increase understanding of the interaction between institutional environment and policies to develop agriculture.

The objective of the research is to explore the implications for poverty alleviation in rural India of developing agriculture through both direct public investment and indirect intervention to affect private decisions. Three areas representing different agrarian structures and different forms of organization and levels of publicly-supplied services have been chosen for the study: (a) Punjab, with "capitalist" farming; (b) Bihar, with feudal and semi-feudal farming; and (c) an area in Andhra Pradesh, with small, peasant-owned farming. Within each of the three areas, the impact upon the poor (in particular, landless labors, tenants, and sharecroppers) from selected policy measures will be quantified. These policy measures consist of direct public investment which increases the supply of irrigation water and indirect intervention including price supports, import subsidies, and subsidized credit.

Unlike the earlier DRC agricultural studies which constructed large sectoral models, this research project will follow a case-study approach and focus on understanding the functioning of interrelated markets for land, labor, credit and output. It is thus an innovative approach relative to previous work in the Center. For this reason, it is being conducted in two phases.

The objective of the first phase is as follows:

- i) To complete a review of the extensive literature relating to the topics of this study;
- ii) To develop a methodology which will permit a rigorous analysis of each of the case studies. However, it seems likely that less formal approaches will be required for drawing out the conclusions which arise from a comparison among the various areas studied; and
- iii) To develop collaborative arrangements for the conduct of the research with a number of Indian research institutions.

It is intended to have completed the first phase by December. While the first component of that phase should not present problems, there are uncertainties connected with the methodology and the institutional connections. It is not intended to proceed further unless these are satisfactorily resolved.

3. Applications

Work on a major research project does not end with the completion of the research phase; it continues with a phase of dissemination and application. The form which this takes varies widely among projects and lines of work. In some (few) cases, publication in the professional literature suffices. In others, a more costly and conscious effort is required. It is to these others that we now turn.

In DRC experience in this area it is necessary to distinguish between two forms of dissemination and application. The first applies to country-related research, such as those projects listed in the first set above. In these cases dissemination extends beyond written reports to include joint work with the national authorities concerned both in their country and in Washington, seminars and workshops, and applications to particular problems. In some instances (Mexico, Brazil, Pakistan) it has proven necessary to locate a Bank staff member in the country during the course of the work for the latter two, and during an explicit application phase in Mexico.

In addition to the substantive research projects and studies outlined above, the DRC also tackles some "quickie" applications motivated studies.

Two examples of the DRC's applications-motivated studies are discussed below. It should be noted that such studies frequently result in research publications, as a by-product; but as can be seen, the initial motivation was to find a solution to a problem which could be modelled quantitatively.

One applications-motivated study was concerned with the Tabora Rural Development Project.^{1/}

Tabora, the largest of twenty regions in Tanzania, was the focus of a comprehensive, production-oriented rural development project, which aimed to strengthen the developmental infrastructure and increase the production of a variety of crops and livestock by smallholders in villages. A previous project had focussed on improved varieties and techniques for tobacco, one of the main cash crops. In considering the various components of the project, it was recognized that the supply of fuelwood, crucial to tobacco curing and domestic uses, could eventually constrain growth in village

^{1/} For a full description of the project see Tanzania: Appraisal of the Tabora Rural Development Project, World Bank Report No. 1360-TA (April 8, 1977). The model is described in Annex 7. John H. Duloy and Gary P. Kutcher of the DRC collaborated with John H. Cleave of the Region and a forestry consultant.

incomes. The question then arose as to whether villagers should begin to cultivate timber in anticipation of forest depletion resulting in longer walking times and higher transport costs.

The spatial and intertemporal nature of the timber investment decision, combined with its interactions with annual and monthly labor allocation decisions, made it virtually impossible to analyze without a model. The model constructed for the analysis maximized the discounted stream of village income (returns to the fixed factors village labor and the natural forest) over a thirty-year horizon, taking into account a range of annual activities related to the fuelwood question, particularly tobacco and maize production, and forest wood cutting. In the absence of timber investment, the model simulated a moderate but steady decline in village annual real income throughout the thirty year period as villagers had to walk further to cut forest wood, and incur progressively higher transport costs. When the option of cultivating a recommended species of plantation timber was given to the model, it was found optimal to plant about 0.1 hectares per year per family. This investment resulted in marginal income declines in the early years, but by year 30, village income was 26% higher than it would have been relying solely on forest wood.

The solution was tested for its sensitivity with respect to discount rates, transportation costs, village size and age assumptions, and found to be stable within realistic ranges of all key parameters. As a result, village cultivation of timber was included as a component of the project, as well as the provision of seedlings. As an externality, the model investigated the influence of the existing subsidy on forest wood

transport costs, and found the subsidy to be simply an income transfer to villagers which could have otherwise been made more efficiently. In the light of this, and ecological considerations, the Government subsequently agreed to phase out the subsidy.

A second application concerned the Nagarjunasagar Command Area Development Project in India.^{1/}

This project sought to complete the irrigation scheme for Nagarjunasagar begun twenty years before with the construction of a dam and parts of two canals, called the left and right banks. One million hectares was under intensive irrigation, but with additional canal construction and appropriate water allocation, an additional 2.2 million hectares were potentially irrigable. Given a limited supply of water, its allocation and subsequent use could not be separated from the design and analysis of the project.

On each of the two banks, there were both red and black soils, and ten spatial delineations for a total of twenty subareas. For each subarea, eight different annual allocation plans were designated, each of which virtually dictated a cropping pattern, labor and other input use, and thus the information to estimate project benefits. Thus for each bank, the project required the simultaneous evaluation of 8^{20} alternatives (8^7 is greater than two million!). Furthermore, each water allocation

^{1/} The project is described in India: Appraisal of the Andhra Pradesh Irrigation and Command Area Development Composite Project, World Bank Report No. 1010a-IN. Gary P. Kutcher of the DRC collaborated with Per Ljung and Chris Perry of the Region.

constituted a mutually exclusive plan, indicating that the problem required mixed-integer techniques on a scale approaching the limits of computational technology.

By taking advantage of special ordered set programming, however, this seemingly intractable problem could be solved quite easily (in about thirty seconds on a CDC 6600 computer). Each subarea was treated as a specially ordered set, the elements of which were the alternative irrigation plans, all linked to common monthly flow and annual water stock constraints.

Because the model could be solved relatively cheaply, it allowed investigation of alternative objective functions. On the one hand, the Government wished to maximize rice production, but on the other hand, it wished to spread the water over as wide a physical area as possible and to benefit as many farmers as possible. The model's results highlighted the conflicts in these goals: with a pure efficiency objective function, the model selected highly water-intensive plans for those subareas nearest the dam (where water losses were minimal), and progressively less intense plans further away until the last subareas received no water at all. The model was then solved with alternative "social" objective functions including distributional weights for the various groups affected by the project, and the tradeoffs made explicit. Apart from recommending optimal irrigation plans and cropping patterns, the model's results led to a scaling down of the right bank extension from 1.17 million acres to 1.0 million. Furthermore, the model took account of the opportunity cost of the water diverted into the new project area, at the expense of wealthier farmers who had been getting unlimited supplies. The effect of recognizing this cost was to

reduce the economic rate of return from 25% to about half that value. On the other hand, the social rate of return, taking account of distributional weights, was higher, and the project was approved.

As is generally the case when a situation is modeled, opportunities arose for uses other than those for which the model was primarily intended. In this case, the model provided the opportunity to "cost out" the politically-motivated allocation of equal water to each bank. On efficiency grounds, it was found a 60:40 allocation would be closer to the optimum than the adhered to 50:50. Changes in the allocations were discussed with the government, but were rejected on the grounds that changes in long-standing water rights are extremely difficult to implement.

4. Directions for the Future

Future directions of DRC work as a whole, and not only in the area of ARD, are currently under discussion within the Center. It is intended to develop a new five-year work program by December 1978. The ideas advanced here are therefore necessarily of a preliminary nature. However, some lines of work are already apparent. These are enumerated below.

Priority, within the constraint of available resources, will be given to continuing existing lines of work in which expertise and experience has been accumulated. Work on agricultural sector and project modelling is expected to continue on two fronts. The first is to carry further the phase of application of results already obtained, both in the work of the Bank and in its member countries directly. Second, efforts will be made to improve further the methodology as regards both the efficiency and timeliness of constructing and using these models, and as regards their content and coverage.

An important point to note here is that the approach adopted so far has been static or comparative static. Some work in the direction of some dynamic models seems called for; many issues, particularly those concerned with uncertainty, asset accumulation and investment, can only be effectively addressed in a dynamic framework.

Second, it seems necessary to move further in incorporating ARD-related issues into an economy-wide context. A concern with alleviating poverty--which is a major focus of most of the DRC's work--necessarily involves a substantial concern with agriculture, even if the viewpoint is mainly that of development alternatives for the economy as a whole. Conversely, and particularly for poor countries, the agricultural sector and the people dependent on it represent so large a part of the whole that an adequate analysis of many of the problems of the sector requires an economy-wide approach. Thus multiplier effects, and responses to the agricultural/industrial terms of trade, cannot be inferred from an agricultural sector model in isolation.

Third, as noted earlier, the project on Indian agriculture may represent the start of a major new line of research within the DRC concerned with institutional issues of development not readily represented in the context of quantitative models. If this proves successful, it may sire a family of derivative projects.

Fourth, available resources may permit a start being made in some other direction, not yet defined. If this proves to be the case, it would seem desirable that the new start should take advantage of (a) the Bank's comparative advantage in carrying out comparative studies across countries

and (b) the growing experience of the Bank in rural development projects and the data being accumulated in monitoring and evaluation components attached to such projects.

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DEVELOPMENT RESEARCH CENTER

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- ** 3. Duloy, J.H., and R. Norton, "Competitive and Noncompetitive Demand Structures in Linear Programming Models," July 1973.
- *** 4. Jain, Shail, and Arthur Tiemann, "Size Distribution of Income: Compilation of Data," August 1973.
5. Ahluwalia, M., and Jorge Cauas, "Policy Instruments and Planning Models for Income Distribution," December 1973.
- * 6. Lluch, C., and R. Williams, "Cross Country Demand and Savings Patterns: An Application of the Extended Linear Expenditure System," December 1973.
- * 7. Cauas, Jorge, and Marcelo Selowsky, "Potential Distributive Effects of Nationalization Policies: The Economic Aspects," January 1974.
8. Duloy, J.H., P.B.R. Hazell, and R.D. Norton, "Agriculture and the Energy Crisis: A Case Study in Mexico," August 1974.
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11. Lluch, C., and R. Williams, "International Patterns in the Elasticity of the Marginal Utility of Income and Expenditure," August 1975.
- * 12. Kakwani, N.C., "Applications of Lorenz Curves in Economic Analysis," August 1975.
- * 13. Kakwani, N.C., "Measurement of Poverty and Negative-Income Tax," August 1975.
- * 14. Balassa, Bela, "The Income Distributional Parameter in Project Appraisal," March 1976.
- * 15. Piñera, Sebastian, and Marcelo Selowsky, "Unemployment, Labor Market Segmentation, and the Returns to Educated Labor," March 1976.

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- * 16. Scandizzo, Pasquale L., "Resistance to Innovation and Economic Dependence in Northeast Brazil," March 1976.
- * 17. Dillon, John L., and Pasquale L. Scandizzo, "Risk Attitudes of Subsistence Farmers in Northeast Brazil: A Sampling Approach," July 1976.
- 17a. Balassa, Bela, "Accounting for Economic Growth: The Case of Norway," August 1976.
- 18. Westphal, Larry E., and Yung W. Rhee, "The Allocative Consequences of Economies of Scale," January 1976.
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- 25. Adelman, Irma, and Sherman Robinson, "Migration, Demographic Change and Income Distribution in a Model of a Developing Country," July 1977.
- 26. Robinson, Sherman, "Income Distribution Within Groups, Among Groups, and Overall: A Technique of Analysis," July 1977.

* Published (see Articles list).

** Published under the title "Prices and Incomes in Linear Programming Models."

*** Published as a book (see Books list).

BRIEFING ON PRIMARY COMMODITY-ORIENTED WORK
IN THE WORLD BANK
AND RELATED ISSUES

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ADVISORY PANEL FOR PRIMARY COMMODITIES

BRIEFING ON PRIMARY COMMODITY-ORIENTED WORK
IN THE WORLD BANK
AND RELATED ISSUES

Introduction

1. Work on primary commodities is undertaken in many parts of the World Bank (see Annex I for overall organizational chart by department). Although the Economic Analysis and Projections Department (specifically its Commodities and Export Projections Division) undertakes the core analytical and data work on primary commodities, other Bank staff are involved in analyzing primary commodity problems and trends. They include the Bank's Regional Staff (through its country economic, sector, and project work); the Central Projects Staff (CPS), other departments in the Bank's Development Policy Staff (DPS), and the International Finance Corporation (IFC).
2. This note summarizes the work of the Commodities and Export Projections Division (EPDCE), the commodity-oriented work of other Bank staff, and raises some issues relevant to the economic analysis and research on primary commodities within the Bank.

The Economic Analysis and Projections Department,
Commodities and Export Projections Division (EPDCE)

Functions and Responsibilities of EPDCE

3. The functions of EPDCE may be divided into four general areas:
 - Operational services
 - Information maintenance and research on basic commodities and trade
 - Policy analysis
 - Liaison with international commodity organizations.
4. The operational services provided by EPDCE include: (a) projection of prices and market outlook for key commodities; (b) direct participation in operational missions; and (c) miscellaneous operational assistance.

5. EPDCE provides annual price forecasts for about forty primary commodities ranging from petroleum, food, other agricultural raw materials, timber, metals/minerals, to fertilizers. 1/ The price projections 2/ are mainly used by the operational departments of the Bank for country assessments of (i) benefits and costs in projects with major primary commodity content (project departments), and (ii) the value of merchandize exports in the analysis of balance of payments (country program departments).

6. A formal review process takes place annually (usually in April) with EPDCE circulating its projections (including detailed assumptions underlying them) to the regions. Reactions are then communicated to the relevant commodity economists directly or in formal review meetings which usually take about four days. After regional comments have been taken into account, the price projections and underlying assumptions are published (in June) as a report (Price Prospects in Major Primary Commodities - Report No. 814) which is then sent to the Bank's Board of Directors for information. Formal revisions of price forecasts are usually undertaken in October/November. The amended forecasts (with brief reasons for the revisions) are circulated to regional staff for comments. However, no meetings are scheduled unless requested by the regions.

7. EPDCE's country mission participation is in the form of staff secondments, mainly to sector or economic missions with a commodity or trade focus. The EPDCE staff's role is usually to evaluate problems specific to a commodity sub-sector, to investigate the commodity element relevant to the

1/ They include: petroleum, coffee, cocoa, tea, sugar, beef, bananas, citrus fruits, maize, rice, wheat, grain sorghum, palm oil, coconut oil, groundnut oil, soybean oil, soybeans, copra, groundnuts, palm kernels, soybean meal, cotton, jute, rubber, tobacco, logs/sawnwood, copper, iron ore, tin, nickel, bauxite, aluminum ingot, manganese ore, lead, zinc, phosphate rock, urea, triple superphosphate, diaammonium phosphate, urea, and muriate of potash.

2/ While the prices projected by EPDCE cover both short term and longer term (about 5 years or more), analytical work is primarily focused on the latter. The main reason is that much of the short term forecasting work is already done by other organizations (e.g. the United States Department of Agriculture for agricultural commodities). Also, an informal understanding on division of labor exists with the International Monetary Fund whose research staff focuses on short term projections while EPDCE staff concentrates on the longer term.

to the analysis of a particular country's balance of payments' problems, and to assess the market prospects for the country's key commodities. Project mission assistance is much less frequent and is usually in the form of assessing appropriate market mechanisms and price outlook for the commodities being produced by the project.

8. Miscellaneous operational assistance includes (i) the briefing of project and sector missions on specific commodity developments (especially in prices and trade), both globally and for the countries being visited; and (ii) keeping Bank management informed of important developments in commodity marketing and undertaking special tasks for senior management.

9. The information maintenance and research functions of EPDCE pertain to the work of its commodity Data Bank and the analytical studies undertaken by its staff.

10. The Commodity Data Bank contains computerized files on prices, trade and production data for a wide range of primary agricultural commodities, a number of metals and minerals and for petroleum and other energy sources. Emphasis is placed on primary commodities which are considered important for the growth of foreign exchange earnings of the developing countries. Where available, price data are stored on a monthly, quarterly and annual average basis for the years 1948 to date; annual time series (1961-76) data are maintained on imports, exports, production and areas harvested by country and by commodity. The chief sources for these data are FAO, USDA, the UN and UNCTAD. The range of commodities covered by the data files far exceed the approximately 40 commodities routinely monitored by EPDCE's commodity economists. The system has only recently been operational and it is capable of responding rather quickly to requests on basic commodity data. It provides a particularly useful base for analytical studies which require standardized data for many commodity categories and countries.

11. The analytical/research studies undertaken by EPDCE staff (see Annex II) consists of (i) individual commodity studies, (ii) studies on general commodity and trade issues, and (iii) development of commodity models as an input for EPDCE's projection work. These studies form the background material for the services rendered by EPDCE as well as having development policy implications.

12. Individual commodity studies are usually concerned with the structure, performance and market prospects for specific commodities. The general studies are usually related to topics of current interest in world development fora (e.g. commodity price stabilization, export performance and diversification prospects in poor countries).

13. EPDCE's commodity modelling studies grew out of the need to develop a more systematic and rigorous understanding of individual commodities and the interrelationships among them. A concerted modelling effort essentially started only about slightly more than a year ago. The initial emphasis is to develop individual models which are structurally and economically relevant for projection work with the capability of being tested against market performance and of being amenable for use in policy analysis. About ten models 1/ are being developed for these purposes, and they were presented in a workshop on commodity models in April 1978. A later stage would involve linking individual commodity models into groups of integrated systems.

14. Recent reports and papers completed in conjunction with EPDCE studies are given in Annex III.

15. EPDCE's role in supporting Bank Policy is related to (i) issues concerning the Bank's role in the financing of specific commodities (see the policy papers for cocoa and tea in Annex IV); (ii) assistance in the preparation of other (more general) policy paper (e.g. the World Development Report); and (iii) providing background papers to inform the Board of Directors concerning recent commodity-related developments (e.g. "World Grain and Rice Situation and Outlook - 1977, quoted in Annex IV) and their implications for Bank financing (see the policy papers for sugar and palm oil in Annex IV).

16. EPDCE also assumes an important role in liaising with international organizations on commodity and trade matters. Divisional staff attend

1/ Cocoa, coffee, tea, sugar, fats and oils, rubber, tin, jute, iron ore and steel, and energy demand.

international commodity meetings and sometimes participate in joint studies with them (especially with FAO and UNCTAD). EPDCE is also responsible for consultations with inter-governmental commodity organizations with regard to the effects of Bank Group projects on world supplies and prices.

Focus of EPDCE Work Program

17. The focus of EPDCE work program (see Annex II) is primarily dictated by operational and policy requirements within the Bank. For instance, the 40 commodities specifically monitored by EPDCE staff represents the commodities for which there are the most operational requests for assistance, though they may not be the most important commodities in overall world trade. The emphasis in policy work is usually in response to requests from Bank management or the Board of Directors for information and guidance on the Bank's role in the financing of key commodities which have important development impact (e.g. tea and sugar), or to inform the Bank about the impact of key world events which have important implications on the development of primary commodities and trade (e.g. proposals for the Common Fund, the impact of 1973/74 increase in energy prices, the role of restrictive policies in commodity lending by developed countries). Specific requests for special studies from governments are answered, if possible, given staff availability and the concurrence of the operational departments.

Papers Issued by EPDCE

18. EPDCE studies are published as papers in a variety of forms. The Economic Analysis and Projections Department has just consolidated them into the following:

- (i) Board or Policy Papers - These are presented to the Board of Directors either for information or discussion (see Annex IV for an inventory of Board papers with commodity content).
- (ii) Contributions to Country/Sector/Project Reports - These are usually in the form of annexes attached to the respective reports (e.g. "Market Prospects for Cashew Nuts" in the Tanzania Cashew Nut Project Appraisal Report; "Sugar Sector Programs, Policies and Prospects" in the Dominican Republic Economic Report).

- (iii) World Bank Staff Occasional Papers - These are analytical studies published in book form by Johns Hopkins University Press. Three occasional papers with commodity emphasis have been published to date. 1/
- (iv) World Bank Commodity Working Papers - These are analytical papers (of shorter length than Occasional Papers) issued by the Economic Analysis and Projections Department. A new series consolidating studies previously published as "Staff Working Papers" and "Commodity Papers" (see Annex III for some samples) will be issued shortly. These papers will form the core of the analytical work done by EPDCE.
- (v) Commodity Notes - These are papers which may not be of broad interest or as sufficiently in-depth as (iv) or (iii), but are nevertheless useful to persons with special interests. Commodity Notes may, for example, summarize the progress of ongoing in-depth research (e.g. choice of beef indicator prices as part of the overall analysis of the world beef economy) or the status of recent specific commodity developments (e.g. "Copper: Current Situation and Short Term Outlook").
- (vi) Blue Cover Reports - These are reports which are given world-wide, unrestricted circulation. The only commodity-related report of this type is the Report No. EC-166 series entitled "Commodity Trade and Price Trends" -- essentially a statistical handbook on commodity trends with supporting charts.

1/ They are:

- No. 17. Kenji Takeuchi, Tropical Hardwood Trade in the Asia-Pacific Region.
- No. 19. Enzo R. Grilli, The Future for Hard Fibers and Competition from Synthetics.
- No. 22. Shamsher Singh and others, Coffee, Tea, and Cocoa: Market Prospects and Development Lending.

Other Bank Staff Involved in Commodity-Oriented Analysis

Other Development Policy Staff (DPS)

19. The Development Economics Department (DED), through work undertaken by the economics and industry divisions and the employment of rural development division, undertakes studies with commodity orientation (examples of such studies include the "Simulation of Buffer Stocks"). The Development Research Center (DRC) also undertakes some commodity-oriented studies (e.g. a study on export incentives involving primary commodities in developing countries, and a study on natural resources and planning). DRC also undertakes micro planning studies in agriculture which have implications for primary crop development.

Regional Staff

20. Regional staff are involved in country-specific primary commodity studies undertaken (either by staff or consultants) as part of: (i) Country Economic Missions (e.g. copper in Chile, bauxite in Jamaica, petroleum in Ecuador); (ii) Sector Missions (e.g. analysis of agricultural commodities in the Agricultural and Rural Development Survey of Kenya by the Projects Department); and (iii) Special Missions (e.g. the West Africa Food Grain Study, EMENA Fruits and Vegetables Study, Indonesia Foodgrain Study).

Central Projects Staff

21. Commodity analysis essentially involves the work of the Agriculture and Rural Development Department; the Energy, Water and Telecommunications Department; and the Industrial Projects Department. The Agriculture and Rural Development Department is, for example, undertaking studies on root and tuber food crops, fisheries development and food grain security studies in specific countries. The Industrial Projects Department has also initiated worldwide studies on fertilizers.

22. The above studies are usually undertaken as (i) part of the World Bank's Research Committee (RPO) financed projects, (ii) part of the regions own operational program; or (iii) as studies requested by the Board of Directors or top management.

23. Research studies financed by the Research Committee of the World Bank are given in Annex V. Other research studies being undertaken by other Bank staff are given in Annex VI.

Major Issues in Primary Commodity Work in the Bank

24. The type of issues to be faced by the Commodities Advisory Panel need to be defined with greater clarity by the Panel itself. Issues related to the Bank's research on primary commodities could, for example, include:

- (i) The relevance of the Bank's commodity oriented research in the Bank with regard to the needs of developing countries;
- (ii) The appropriateness of the dissemination of the Bank's commodity research to member countries; and
- (iii) The cost-effectiveness of the Bank's research work on primary commodities.

25. Since the function of the Panel is to evaluate the Bank's overall commodity work in addition to its research program, the Panel would necessarily have to come to grips with other issues related to:

- (i) The proper role of commodity-oriented work in the Bank;
- (ii) The need to rationalize the use of Bank staff in undertaking commodity-oriented tasks related to operational services, research and policy; and
- (iii) The scope of the Bank's primary commodity policy in relation to its role in assisting the development efforts of developing countries.

26. All these issues cannot be adequately tackled within the one week meeting scheduled for the Panel on Commodities. The emphasis for the initial meeting of the Panel would probably have to be the understanding of the workings of the Bank, its functions and priorities, and the relative emphasis of its working programs. The initial meeting of the Panel might more productively focus on defining key issues in greater detail or identifying further issues which need to be tackled and to provide guidance on the priority of these issues.

(organizational chart)

EPDCE: THREE YEAR WORK PROGRAM OF STUDIES IN TRADE AND COMMODITIES

	<u>1977/78</u>	<u>1978/79</u>	<u>1979/80</u>
<u>I. TRADE TRENDS AND POLICY</u>			
Export Trade of the (Non-Oil) Developing Countries - A continuing review for global framework	x	x	x
Intra-LDC Trade			
(i) Constraints and Opportunities;	x -----	x	
(ii) Complimentarities and Competitiveness		x -----	x
Export Performance and Diversification Prospects for the Smallest and Poorest Countries		x -----	x
Sensitivity of Developing Country Exports to High Income Countries' Growth	x -----	x	
Processing Primary Commodities	x -----	x	
Export Potential of LDC's: South Asia and Sub-Sahara	x		
<u>II. COMMODITY ISSUES</u>			
Price Prospects for Major Primary Commodities	x	x	x
Key Developments in Primary Commodities	x		
Integrated Program for Commodities (Brief Board Papers reporting on the status of UNCTAD negotiations)	x	x	
Commodity Price Stabilization and Developing Countries: The Problem of Choice	x		
Tree Crops in East Asia and Pacific Region		x -----	x

x Indicates the FY in which the study will be completed.

x ----- x Indicates that the study will overlap two FYs.

	<u>1977/78</u>	<u>1978/79</u>	<u>1979/80</u>
III. <u>DATA BANK AND PRICE ANALYSIS</u>			
Commodity Data Bank	x	x	x
Trade Matrixes	x	x	x
Trade and Price Trends	x	x	x
Relationship between Market Quotations and Export Unit Values	x	x	
Comparative Price Movements of Selected Metals	x	-----	x
IV. <u>COMMODITY MODELS</u>			
A Linked System of Commodity Models (for WDR)		x	
Rice Model	x	x	x
Grain-Feed-Livestock Model (Penn. State)		x	----- x
Iron Ore/Steel Model	x	x	x
Copper Model	x	x	x
Cocoa Model	x	x	x
Sugar Model	x	x	x
Tea Model	x	x	x
Tin Model	x	x	x
Fats and Oils Model	x	x	x
Rubber Model	x	x	x
Cotton Model	x	x	x
Energy Demand Model for Developing, Developed Countries and CPEs	x	x	x
Energy Supply Models	x	x	x
Integration of Energy Demand and Supply Models		x	----- x
Bauxite, Alumina & Aluminum: An Econometric Model	x	x	x

	<u>1977/78</u>	<u>1978/79</u>	<u>1979/80</u>
V. <u>ECONOMIC AND SECTOR MISSIONS</u> (various)			
As requested by Regions	x	x	x
VI. <u>INDIVIDUAL COMMODITY STUDIES</u>			
(i) <u>Energy</u>			
Energy Demand Prospects in Non-OPEC Developing Countries	x		x
Energy Policy Analysis Framework for Selected Non-OPEC Developing Countries		x	
Energy Pricing Policies of Non-OPEC Developing Countries		x	
World Outlook for Coal	x		
World Outlook for Natural Gas		x	
World Outlook for Petroleum	x	x	x
Energy Supply Prospects and Capital Requirements in Non-OPEC Developing Countries to 1985	x		
(ii) <u>Metals and Minerals</u>			
Market Outlook for Iron and Steel	x		
Tungsten Outlook	x		
Nickel Prospects for LDCs	x		
Changing Structure of World Copper Industry		x	
Zinc: LDC Potential		x	
Uranium Potential in LDCs			x
Chromium: A Critical Material?			x
An International Buffer Stock for Copper	x		
Market Outlook for Bauxite, Alumina & Aluminum		x	
Fluctuations in Invisible Stock: A Problem for Copper Market Forecasting	x		
The World Tin Economy: An Econometric Analysis	x		

	<u>1977/78</u>	<u>1978/79</u>	<u>1979/80</u>
<u>(iii) Agriculture - Non-Food</u>			
The World Rubber Economy: Trends & Prospects	x		
International Cotton Market Prospects	x		
The Prospects for Jute Revisited		x	
Tobacco Prospects	x		
Pulp and Paper Prospects in LDCs	x		
Forest Products in Latin America		x	x
<u>(iv) Agriculture - Food</u>			
Investment in Oil Palm	x		
Market Prospects for Coconut Products		x	
Coffee: Supply and Demand Outlook		x	
World Cocoa Economy: Structure and Performance	x	-----	x
Tea: Possibilities for International Action	x		
World Tea Economy: Structure and Prospects		x	
World Food Situation and Short-Term Outlook	x	x	x
World Beef Indicator Prices	x		
World Beef Economy: Structure and Performance		x	----- x
Near East/East Africa Meat Study	x		
Sugar Board Paper	x		
World Banana Economy: Performance and Prospects for Change		x	
Oilseeds and Fats & Oils - Long Term Prospects	x		
The Market for Cashew Nuts	x		

x Indicates the FY in which the study will be completed.

x ----- x Indicates that the study will overlap two FYs.

LIST OF RECENT PAPERS COMPLETED BY EPDCE

<u>Subject</u>	<u>Author</u>	<u>Type of Paper</u>
<u>General</u>		
Price Prospects for Major Primary Commodities	Division Staff	Board Paper
Commodity Trade and Price Trends	H. Bothwell	Blue Cover Report (EC-166/76)
Possible LDC Export Gains from Elimination of Trade Barriers in Major Primary and Semi-Processed: (a) Agriculture Sector; (b) Mineral Sector	Division Staff	Input to Liberalization of Trade in Industrial and Agricultural Products
Private Foreign Investment and Economic Development: A Case Study of Petroleum in India	R. Vedavalli	Cambridge Univ. Press
Coffee, Tea, and Cocoa: Market Prospects and Development Lending	S. Singh J. de Vries J. Hulley P. Yeung	Occasional Paper
<u>Agricultural Food</u>		
Prospects for Palm Oil	P. Pollak	Commodity Paper
High Fructose Corn Syrup: Its Significance as a Sugar Substitute and Its Impact on the Sugar Outlook	E. Brook	Commodity Paper
Meat Consumption, Production and Trade in the Near East and East Africa	P. Yeung W. G. Tyler	Commodity Paper
Developing Country Foodgrain Projections for 1985	S. Hadler	Working Paper
Demand Trends and Prospects for Food in Portugal	M. C. Yang	Contribution to ASR
Sugar Industry in Mauritius	E. Brook	Contribution to ER
Dominican Republic - Sugar Sector Programs, Policies and Prospects	C. Chung	Contribution to ER
Information Note: Palm Oil	P. Pollak	Commodity note

<u>Subject</u>	<u>Author</u>	<u>Type of Paper</u>
<u>Agricultural Non-Food</u>		
The Future for Polyester Fibers on a World Basis	E. Thigpen	Shirley Institute Seminar Paper
The Current Polypropylene Situation in Wester Europe and Prospects to 1980	E. Thigpen	Commodity note
<u>Minerals and Metals</u>		
Silver: Supply and Demand Dimensions	J. Hilmy	Commodity Paper
Market Structure of Bauxite/ Alumina/Aluminum: Prospects for Developing Countries	R. Vedavalli	Commodity Paper
Investment Requirements in Non-Fuel Mineral Sector in the Developing Countries	K. Takeuchi G. Thiebach J. Hilmy	Published in <u>Natural Resource Forum</u>
No Significant Substitution for Silver Seen Before the Eighties	J. Hilmy	Published in <u>Report</u>
<u>Energy</u>		
Energy Problems of the Non-OPEC Developing Countries, 1974-80	A. Lambertini	Published in <u>Finance and Development</u>

ASR: Agricultural Sector Report.

ER: Economic Report.

Commodity note: A background division paper.

ADVISORY PANEL FOR PRIMARY COMMODITIES

BRIEFING ON PRIMARY COMMODITY-ORIENTED WORK
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<u>Subject</u>	<u>Author</u>	<u>Type of Paper</u>
<u>General</u>		
The International Dialogue on Commodities	S. Singh	World Bank Reprint Series No. 39
Market Shares under International Agreements	S. Singh	Memo. dd. October 13, 1976
Prospects for Developing Countries' Contributions to the Sections on Trade and Commodities	Division Staff	Blue Cover Report November 1977
World Economic & Social Indicators - Survey of Economic Trends	EPD	April 1978
Economic Development to 1985: A Summary Report on the Global Framework for the World Development Report	EPD	April 1978
<u>Agricultural Food</u>		
Cocoa Production-Economic Botanical Perspectives	S. Singh P. Yeung	Praeger Special Studies on International Economics & Development 1976.

WORLD BANK POLICY PAPERS ^{1/} WITH COMMODITY ORIENTATION

Paper	Date and Reference	Date Discussed	Remarks
<u>A. Papers Discussed by the Board</u>			
"The World Cocoa Market - Review and Outlook for Bank Lending"	R74-36 Feb 22/74	Apr 2/74	EDs ^{2/} discussed and generally agreed with the background report, prepared by Economic Analysis and Projections Department, recommending that Bank proceed with the cocoa projects already in the pipeline, as the market prospects and price projections are favorable and that the market outlook be reviewed periodically.
Financing of Tea	R73-206 of Aug 17/ 73	Sept 11/ 73	EDs approved the policy guideline that (a) the Bank would not undertake further financing of projects involving tea production excepting (i) countries where no investment alternatives yielding an acceptable rate of return, and (ii) for rehabilitation involving maintenance or improvement in quality and no increase in output; (b) projects for diversification out of tea production be encouraged and (c) the policy to be reconsidered if there is a significant change in long-term market outlook for tea.
"Trade Liberalization and Export Promotion, Development Policy Staff, June 30, 1977"	SecM77-571 Jul 12/77 (Report No. 1661)	Sept 13/ 77 (Informal Session)	Examines effects of continued trade liberalization on exports of developing countries; emphasizes importance of avoiding new barriers to trade in developed countries.

1/ Policy papers presented to the World Bank's Board of Directors.

2/ Executive Directors.

Paper	Date and Reference	Date Discussed	Remarks
Minerals and Energy in the Developing Countries	R77-121 May 6/77	July 7/77	EDs discussed the report and agreed on the following: (a) financing requirements for fuel and nonfuel resource exploration would exceed the available resources from private and governmental sources; (b) in the interest of both developed and developing countries, financing of economically justifiable projects should be provided; (c) Bank should expand its program in the area, with particular emphasis on technical assistance and catalytic roles; (d) Bank's program should be fully coordinated with the regional banks; (e) management should report to the Board on its experience in this area within a year.
"Fertilizer Requirements of Developing Countries", Mar 15/74	R74-109 May 21/74	July 5/74	EDs discussed the report and generally endorsed the approach for expansion of Bank's operational program in this field.
Bank Group Research Program	R77-9 IDA/R77-5 Jan 13/77	Feb 15 and 17/77	EDs discussed the President's memo attaching report from the Vice President, Development Policy, providing the fourth annual review of the socio-economic research activities in the Bank.
Development Policy for Countries Highly Dependent on Exports of Primary Products	R73-3 of Jan 4/73	Jan 30, Feb 6, Feb 13/73	EDs approved President's memo recommending development policy for countries highly dependent on exports of primary products which face inelastic demand: Recommendation includes analysis of comparative study for tea and cocoa; expansion of assistance to the "least developed countries"; further research in agricultural production and marketing; increased support for economic integration; and attention to export potential in project analysis.
	R73-3/1 of Feb 8/73		Statement by Mr. McNamara made at Board meeting, January 30, 1973, expanding recommendations of paragraph 7 of R73-3.
	R73-3/2 of Feb 16/73		Statement by Mr. Alderwereld during Board discussion of President's Memorandum (R73-3) on February 13, 1973, to be regarded as forming part of that report.

Paper	Date and Reference	Date Discussed	Remarks

B. Papers Presented to the Board for Information

"Forestry: Sector Policy Paper", Agriculture and Rural Development Department, September 15, 1977	SecM77-757 Oct 25/77 (Report No. 1778)	-	Outlines new proposed forestry lending program with greater emphasis on environmental and rural development forestry, institution building projects and industrial forest projects.
"Prospects for Palm Oil" Commodity Paper No. 23, August 1976	Uncoded (EDL76-41) Circulated to EDs on Aug 3/76	-	Report, prepared by the Economic Analysis and Projections Department, concluding that investment in palm oil will remain profitable and that Bank's continued support is advisable in cases where palm oil projects have priority in country lending programs.
"The World Sugar Economy: Review and Outlook for Bank Group Lending", Economic Analysis and Projections Department,	Report No. 1894 Feb 2/78	-	Background report on (a) recent developments in the world sugar market (including an assessment of the latest International Sugar Agreement); (b) future market prospects; and (c) the role of the Bank Group in sugar financing.
Tin Buffer Stock	SecM75-378	-	The President's memorandum informed the EDs that the International Tin Council has asked the Bank to consider a loan to help finance tin buffer stock. The President informed that he would schedule a discussion with the Board and proposed loan prior to entering into negotiation of its terms.
Cotton Development International (CDI)	SecM77-602 July 22/77	-	President's memo attaching, for information of EDs, a "Proposal for the Establishment of Cotton Development International", prepared under leadership of UNDP with Bank staff and Rockefeller Foundation. CDI's primary objectives would be to improve cotton production techniques and to expand use of cotton in textile industry.

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Paper	Date and Reference	Date Discussed	Remarks
"Market Prospects for Rice - Framework for Commodity Lending in 1973-74"	SecM72-524 Oct 16/72	-	This report has been designed to provide the market foundation for rice projects to be submitted to the Board in fiscal 1973 and 1974. It will replace the individual annexes which presently accompany each project report, and should give a better perspective to the Bank's lending program for rice production. The paper proposes that (a) there is no alternative to investing in rice as a stimulus to overall growth in a number of countries; and (b) the price of not investing could be high indeed. Inadequate investment could leave the new production potential of the green revolution unrealized and could precipitate renewed food crises.
"World Grain and Rice Situation and Outlook - 1977"	SecM77-608 Jul 27/77	-	This annual note summarizes the production, trade and price performance for world grain and rice in recent years and reviews their outlook for the forthcoming year.

WORLD BANK RESEARCH COMMITTEE-FINANCED STUDIES WITH
COMMODITY ORIENTATION

1. This section summarizes the Bank's Research Committee approved (RPO) projects which have commodity content. 1/ These projects (in chronological order) are:

- A. Prospects for Jute and Competition from Synthetics
- B. Oxford Seminar on Inflation and Commodity Prices
- C. Comparative Analysis of Resource Allocation in Cocoa Production
- D. Linkage of Commodity and Country Models
- E. Natural Resources and Planning - Issues in Trade and Investment
- F. Agricultural Commodity Projections
- G. Simulations of Buffer Stocks
- H. Export Incentives in Developing Countries

Prospects for Jute and Competition from Synthetics (RPO-211)

2. This project was initiated by the Commodities Division of the Economic Analysis and Projections Department in November 1972. Total expenditure was \$15,000.

3. The study focuses on trends in jute consumption and analyses the most important factors which affect the competitive relationship between jute and synthetics. It examines in considerable detail the relative cost structures of jute and synthetic products and attempts to forecast their developments in the context of cost-push pressures in the synthetic industry which are expected as a consequence of the changes taking place in the field of petrochemical feedstocks.

1/ A survey of all these Research Committee approved projects is given in the World Bank Research Program, January 23, 1978.

4. A paper was published on January 30, 1974 as a Bank Staff Working Paper (No. 171). It was distributed at FAO's request, at the 8th Session of the FAO Intergovernmental Group on Jute, Kenaf and Allied Fibers, Rome, February 1974. Copies of the Working Paper were sent to the governments and industries of the jute producing countries.

Oxford Seminar on Inflation and Commodity Prices (RPO No. 670-82)

5. The Commodities Division of the Economic Analysis and Projections Department was responsible for this project. A seminar was held at Oxford in October 1973. The total expenditure was \$4,500.

6. The purpose of the seminar was to exchange views on conceptual and methodological issues concerning the effect on commodity prices of inflation in the developed industrialized countries and of changes in major exchange rates and to formulate research proposals on that subject. Professor Alan Brown organized the seminar; participants included representatives from UNCTAD, FAO and IMF and some well-known commodity economists, econometricians and theorists from Europe.

7. The main issues raised at the seminar were:

- (i) Relation of 'general' inflation to individual commodity papers;
- (ii) General versus partial analysis of price development;
- (iii) Problems related to exchange rate flexibility;
- (iv) The significance and measurement of relevant elasticities.

A summary of papers presented are in EPDCE files.

Comparative Analysis of Resource Allocation in Cocoa Production (RPO-281)

8. Commodities Division of the Economic Analysis and Projections Department initiated this project in July 1973. It was executed in collaboration with Stanford Food Research Institute at a cost of \$22,000. The completion date was July 1974.

9. This paper reports the first attempt to study comparative advantage in cocoa production in a few key countries. The positive result of the study is the identification of a theoretical approach to a complicated problem

applying some of the latest analytical techniques. The method illustrates an approach to evaluation of alternative investment projects for the cocoa sector both within and between countries. Because of inadequate statistical data, the findings are inconclusive and need detailed qualifications.

10. This paper was published on July 26, 1974 as Board Paper No. SecM74-528.

Linkage of Commodity and Country Models (RPO 671-28)

11. This project was initiated in July 1975 and the final report is due in 1978. The total expenditure was \$100,500. The Economic Analysis and Projections Department in collaboration with Professors L. Klein and G. Adams of the University of Pennsylvania are responsible for the project.

12. This project is primarily designed to provide information on the mechanisms linking the economies of developed and developing countries through the construction of a model describing the markets of the main primary commodities. This model will make it possible to estimate the impact of business fluctuations in developed countries on prices and trade of primary commodities. It will also shed light on the factors that affect the foreign exchange earnings of developing countries as well as the impact of commodity prices on inflation in developed countries. It establishes a more comprehensive linkage of price (export unit value) fluctuations with the economic performance of key business sectors in the developed countries and also permits a detailed examination of the implications of price stabilization.

13. This project is mainly designed to provide financial support to Project Link. Project Link is an econometric system of the world economy, which is the result of a cooperative effort by private and official research centers in developing and developed countries at the IMF and UNCTAD. However, the Link Model encompasses three general commodity models (food products, fuels and raw materials). This project expands the number of commodity models to twenty.

14. A paper "Commodity Models in the Link System: An Empirical Appraisal of Commodity Price Impacts" was presented at the conference on "Stabilizing World Commodity Markets: Analysis, Practice and Policy", Airlie, March 17-20, 1977 and at the Project Link spring meeting, New York, March 21-23, 1977.

Natural Resources and Planning - Issues in Trade and Investment (671-09)

15. This project was initiated by the Development Research Center and the Development Economics Department in 1974. The expected date of the final report is sometime in 1978. Total expenses were \$165,000.
16. This study involves the formulation and application of commodity models in selected sectors. The ultimate objective of the research is to provide the analytical tools and the data format to analyze global supply and demand conditions of important natural resources and resource-based secondary commodities (particularly copper, bauxite/aluminum and forestry/pulp and paper industries). Energy, investment planning and the dynamics of commodity markets are the main topics.
17. For each commodity, two types of models are being developed: (i) a mixed-integral programming model of the industry that will be used to determine globally optimal investment, production and shipping activities, and (ii) regional planning models.
18. Research on the dynamics of commodity models is focused on issues such as stabilization policies, effects of random stocks on price movements, the nature of extraction costs and cartelization. The results from long-run simulations were used to modify the assumptions underlying the investment planning models. More specifically, the project has two main goals, (i) derivation of shadow price rules for evaluating extraction of resources, and (ii) development of small-scale sector models for exhaustible resources.
19. In addition to the following papers which are completed, a general paper summarizing the technical aspects of the research will be written:
- Hochman and Zusman, "The Structure of Regional Demand for Energy"
 - Damment and Kendrick, "A Model of the World Aluminum Industry"
 - J. Anderson, C. Blitzer, T. Corchois, E. Grilli, "A Dynamic Simulation Model of the World Jute Economy"
 - C. Blitzer, T. Cauchois, G. Thiebach, "A Dynamic Simulation Model of the World Copper Economy"
 - A. Damment, D. Kendrick, "A World Copper Model"

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- P. Dasgupta, G. Heal, "Modelling Alternatives for Natural Resource Analysis"
- D. Newberry, J. Stiglitz, "Topics in the Theory of Price Stabilization"
- R. Pindyck, "Optimal Exploration and Production of a Non-Renewable Resource"
- M. Weitzman, "Decision Rules for Once and For All Projects".

Agricultural Commodity Projections (SR 671-23)

20. This research project was initiated in February 1975 and the final report is expected by July 31, 1978. The total cost of the project was \$50,000. The main responsibility of the project lies with the Economic Analysis and Projections Department and with Professor T. Takayama and S. Schmidt of the University of Illinois.

21. This project, supported jointly by the World Bank and the Ford Foundation, aims at constructing a world model of grains (wheat, rice, maize and other coarse grains), soybeans, cotton, beef, pork and poultry for 20 countries or regions. The model will contain demand and supply functions for these products in the various regions. The goal of the study is to evaluate the effects of possible policy changes on the strategic variables and to determine the feasibility of establishing a workable and efficient model for the rational planning of the world food economy.

22. Supply and demand functions for the main countries have been estimated, and a two region (US and the rest of the world) model has been established. Simulations of past performance of commodity markets (1970 through 1974) and projections to 1980 using the integrated world agricultural model have been attempted.

23. Papers published to date include:

- Development of Integrated System for International or National Agricultural Commodity and Energy Projection and Planning Models
- World Food Projection and Policy Evaluation, Report Number 1 - The Eight Agricultural Commodity and Twenty Regional World Food Economy Model for 1974

- World Food Projection and Policy Evaluation, Report Number 1 - The Eight Agricultural Commodity - Two and Twenty Region World Food Economy Model for 1973 and 1974
- Dynamic Market-Oriented World Food Projection and Planning Models and their Empirical Results for 1970-1974 World Food Situation - Revised July 14, 1976
- Projection and Evaluation of Trends and Policies in Agricultural Commodity Supply, Demand, International Trade, and Food Reserves, Parts I and II
- World Food Production Models, Projections and Policy Evaluations.

Simulations of Buffer Stocks (SR 671-24)

24. Development Economics Department started this project in December 1976. The final report is expected in December 1978. The total expenditure was \$38,100.

25. The objective of this research project is to make it possible for planners to assess quantitatively the benefits and costs of buffer stocks to farmers, consumers, the government budget and the general economic welfare. Since not all benefits lend themselves to easy quantification, the stabilization effect is separately assessed to facilitate subsequent judgments about the magnitude of indirect benefits.

26. The costs and benefits of stabilization are largely determined by the capacity utilization of storage facilities and the time intervals between good and bad harvests. An international model examines the effects of stocks for a given probability distribution of annual world production and alternative storage rules. A national model examines the effects of stocks for profitability distributions of annual production in the country and world price, alternative trade and storage rules, and government policies to maintain a minimum level of consumption by the low-income population.

27. The second phase concentrates on expanding the national model to permit examination of the impact of employing trade policies to stabilize consumption; of using shadow prices of foreign exchange in evaluating the costs and benefits of trade, of administering a floor price policy for farmers, of constraining import activity to reflect congestion costs in part, of

relaxing the "small counting" assumption, and of year-to-year correlation in production.

28. Two reports were completed during the report period:
- (i) Food Insecurity: Magnitude and Remedies (Working Paper 267), and
 - (ii) Food Price and Supply Stabilization: National Trade and Buffer Stock Policies.

Export Incentives in Developing Countries (RPO 671-35)

29. Development Research Center 1/ initiated this project in January 1976. The final report is expected in December 1979.

30. This project will evaluate the export promotion efforts of four developing countries in a comparative framework. The four countries, chosen for geographical diversity, duration of the export promotion effort, the kinds of export promotion utilized, and the relative importance of export incentives and import substitution, are: Brazil, Greece, the Republic of Korea and Pakistan.

31. The main focus of the country studies will be a cross-section investigation of major export products for the latest year for which data are available. Rates of export-incentives will be estimated and compared with the social profitability of specific exports. This will also permit the researchers to consider the supply and demand constraints to export expansion, the existence of 'cross-subsidization', of exports, and the assessment of, and reactions to, export incentives by individual firms.

32. This analysis will be supplemented by a study of each country's export promotion effort over time and its effect on the growth of exports. Coverage will include traditional as well as non-traditional exports. Primary

1/ In collaboration with the following authors of the country studies: Brazil - Jose Roberto Mendouca de Barros and Mauricio Barata de Paula Pinto; Greece - Demetrious Papageorgion, Development Economics Department and Evan Volondakis, Center for Planning and Economic Research, Athens; Korea - Gary Pursell and Yung Rhee of the Development Research Center, and Suk Tai Suh, Korea Development Institute; Pakistan - Mohammed Zuhair Khan, Pakistan Development Institute.

commodities are discussed as part of an overall analysis of agricultural and manufactured goods. Finally, the contribution of export expansion to economic growth will be analysed.

33. World Bank Staff Working Paper No. 248 came out in January 1977. The title is "Export Incentives and Export Performance in Developing Countries: A Comparative Analysis".

OTHER BANK STAFF STUDIES WITH
COMMODITY-ORIENTATION 1/

A. The Agricultural Department, Central Projects Staff, is responsible for the following studies:

(i) Foodgrain Strategy - Prospects and Issues

Based on an assessment of foodgrain production and consumption patterns in 23 foodgrain importing LDC's and 5 exporting LDC's. An attempt will be made to assess the requirements for achieving adequate 'food security' for each country, in terms of investment required and the limitations on absorptive capacity in terms of technology, institutes and policies. This will be a staff working paper.

(ii) Root and Tuber Foodcrops

This study examines the production and use of root crops (Cassava, sweet potato, potato yams, taro/coco yams and others) and their current role and future potential in development; especially with respect to their function as the basic food source for the poorest rural groups.

(iii) Strategies and Policy for Foodgrain Security

The study focuses on the policy issues and past performance of international and country programs to meet food security. The policy issues that will be investigated are the feasibility of private and public holdings of buffer stocks, the question of centralized or decentralized locations, effects on production, the potential trade off between price stabilization and food security, the role of price and subsidy incentives

1/ This inventory is incomplete. It will be updated in the course of the Advisory Panel meetings.

in the holding of stocks, and the implications of food security to rural, national and global planning. This will be a staff Working Paper.

(iv) Fishery - Development Prospects and Problems

The purpose of this study is to assess the present state of fishery activity in developing countries and to evaluate its potential contribution to rural development, and the constraints in realizing this potential.

The Agricultural Department, Central Projects Staff, has completed the following study:

Forestry Sector Policy Paper, February 1978.

This paper (a) examines forestry development and its linkage with rural development, industrial development and the environment; (b) discusses the problems faced in designing forestry projects; (c) reviews the World Bank's role in forestry development; and (d) proposes guidelines for future Bank lending in the forestry sector.

B. The Industrial Projects Department, Central Projects Staff, has initiated the following studies:

(i) World Phosphate Survey (Ref. No. R403)

This study will compile and update a comprehensive phosphate manual covering phosphate rock reserves and resources; mining and fertilizer production costs; phosphate rock and fertilizer markets as well as agronomic considerations and non-fertilizer uses of phosphates.

(ii) Fertilizer Research (Ref. No. R401)

This is an on-going research activity to maintain an up to date fertilizer data bank. Primary emphasis is placed on the preparation of medium and long term projections for

fertilizer supply and demand by nutrient. Fertilizer marketing and distribution models as well as investment models are prepared in order to assist in projecting fertilizer production and marketing costs.

(iii) World Potash Survey (Ref. No. R401)

This study will review the world potash scene including potash resources, mining and refining costs, supply/demand balances and future price outlook for potash fertilizers. This study has been completed.

C. Regional Staff

Various sector surveys, particularly in agriculture, undertake commodity-oriented analysis. Some of the countries covered are:

Brazil, Honduras, Malaysia, Thailand, Philippines, Kenya, Ethiopia, Indonesia, Tanzania, Iran, Portugal, Nepal, Bangladesh, Sri Lanka and Pakistan.

Special commodity-oriented surveys have also been undertaken by Regional staff. Examples of reports published by the regions are:

"The World Jute Economy", Report No. 1141-BD

"Western Africa Foodgrain Study", Report No. 1252-WA

"Fruits and Vegetable Study", EMENA.

Some of these studies were undertaken by the regions because EPDCE did not have the staff capacity to handle the job for them.

D. Office of the Vice President of Finance

A study on minerals and energy in the developing countries (Board Report No. 1588) was completed in May 1977. The report is a result of the Bank's assessment of the International Resources Bank (IRB) proposal, which was undertaken at the suggestion of the Development Committee. It concluded that the IRB is not an effective way of facilitating private capital investment in the LDCs, and that the Bank Group should initiate lending for petroleum

projects and expand lending for other mineral projects. Although the report was prepared by the Financial Vice President's Office, the Industrial Projects Department, IFC, the Legal Department and the Commodities Division made major contributions.

OFFICE MEMORANDUM

TO: External Research Advisory Panel on
Industrial Development and Trade

FROM: Larry E. Westphal, Chief, Economics of Industry Division,^W
Development Economics Department

SUBJECT: Industry and Trade Research within the World Bank Group

DATE: July 20, 1978

The purpose of this memorandum is to indicate the factors that condition the style and content of research on industry and trade within the World Bank Group, as seen from the perspective of a research manager. The memorandum further outlines my own views regarding priorities with respect to the management of research, largely focusing on the industry--as opposed to the trade--side. It is not intended to provide a comprehensive overview of past, on-going, and prospective research; to the degree that specific examples are given, they are mostly drawn from the portfolio of the Economics of Industry Division. Finally, it should be noted that this is a draft and may be revised in light of our discussions if needed to clarify any ambiguities and to amplify where it appears necessary.

The memorandum is organized as follows. First, the potential consumers of research on industry and trade are identified, with some indication being given of their specialized responsibilities, from which their interests in research may be inferred. The suppliers of research on industry and trade are then identified, following which the staff resources available for research on industry and (in particular) trade in manufactures are estimated. Next, the memorandum discusses a number of issues in the management of research on industry and trade. The concluding section indicates how these have been resolved in the management of the Economics of Industry Division's work program.

Potential Consumers of Research Within the Bank

Within the Bank Group, the potential consumers of research on industry and trade consist of the operating units, the formulators of Bank policy, and those concerned with technical assistance.

Operational Units: By far the most numerous, diverse, and consistently vocal of these are the operating units. The principal units involved in industrial work are indicated below, with a brief sketch of their respective responsibilities.

DISTRIBUTION

External Panel -- Messrs. A. Lindbeck, J. Donges, K. Parikh, R. Nelson
E. Bacha, J.I. Kim, G. Bueno.

cc: Industry and Trade Research Steering Group -- Messrs. D. Gordon, IDF;
B. Balassa, DRC; H. Fuchs, IPD; R. Gulhati, EAN; F. Moore, IDF;
R. Richardson, CDD; and B. Waide, ASA.

Research Committee Members -- Mr. D.J. Wood (PAB)

Messrs. H. B. Chenery, S. Bery, A. Gelb (VPD);

B. B. King, E. Stoutjesdijk, V. V. Bhatt, M. Leiserson (DED);

Mrs. H. Hughes (EAP)

DEDND Staff Members

Within the Bank's Regional Offices:

Program Departments: Program Departments are responsible for establishing priorities with respect to the Bank's activity in each member country to which it is lending, and for guiding and overseeing the details of this activity. The point of contact with research is their conduct of country economic analysis, the aim of which is to assess alternative development strategies for individual countries, both across and within sectors. Country economic analysis feeds both the design of lending programs and the dialogue with local officials concerning national policies at various levels.

Project Departments: The locus of industrial work within each project department is the Industrial Development and Finance (IDF) Division. These divisions have principal responsibility for three of the four avenues of Bank industrial lending: lending to Development Finance Companies (DFCs), which are typically industrial development banks and which, in turn, lend to finance individual projects; lending for program support, which is in the form of import credits designed to alleviate extreme foreign exchange shortages and which carry various stipulations concerning desirable changes in policy; and, sector loans, which do not presuppose an emergency situation, but provide support for comprehensive sectoral development programs consisting of an integrated set of individual projects and supporting policy measures. Nearly half of Bank lending to industry is through DFCs, where the final recipients are small and medium enterprises.

The IDF Divisions also conduct most of the industrial sector analysis in individual countries, and this forms their major point of contact with research. Industrial sector analysis ranges from broad-gauged sector reviews through narrowly focused assessments of individual sub-sectors such as machinery or small scale enterprises, as well as detailed reviews of policies (e.g., industrial incentives) and institutions (e.g., financial intermediaries).

Within the Bank's Central Projects Staff (CPS):

Industrial Projects Department (IPD): Responsibility for the fourth avenue of Bank industrial lending rests with this department, which oversees direct lending to large scale projects within the industrial (and mining) sectors.^{1/} These projects are typically found in sub-sectors such as fertilizer, petrochemicals, cement, metals refining,

^{1/} The other three avenues of Bank lending to industry are largely the responsibility of the Regional Projects Departments and were discussed above.

textiles, and machinery. So far, the volume of lending within these sub-sectors in the individual regions has not been sufficiently large to justify decentralizing this type of lending to the Regional offices.

IPD has formal responsibility for sub-sector studies in those sectors to which it lends. Among other policy issues, such studies are concerned with the timing, scale, and location of highly interdependent projects having obvious complementarities. This aspect has formed the point of contact with research in the past, though we are beginning to become involved in project design questions in sectors such as textiles, largely with respect to choice of technology issues. Through its project work, IPD also monitors global trends in the sectors in which it is active. This is most extensively done in fertilizers, for which a formal Fertilizer Unit has been established.

Industrial Development and Finance Department (IDFD): This department has responsibility for guiding and monitoring the conduct of industrial sector work by the regional IDF units, particularly as regards operational policies (e.g., in respect to lending to DFCs) and intra-sectoral priorities. As the central staff unit having functional oversight responsibility for most industrial sector analyses, including those that assess prospects and priorities over the sector as a whole, IDFD is strategically placed as a demander and consumer of research. Indeed, its staff are beginning to generate research, though they participate more extensively in the operational analyses of the regional IDF units.

Urban Projects Department: This department is directly responsible for urban sites and services lending, which is centralized rather than being distributed among the regional offices. It has had and continues to play a major role in defining and orchestrating the Bank's "attack on urban poverty," which among other things involves increased lending to small and medium scale enterprises and greater emphasis on labor-intensive production in the urban sector.

Project Advisory Staff: This unit establishes policies with respect to, and oversees the application of, project evaluation criteria. Among other specialized units it includes the Bank's Science and Technology Advisor, who has had a particular concern with whether appropriate technologies are being employed in particular projects. In addition, together with other Bank units, the Science and Technology Advisor has been involved in several loans for R, D & E in the industrial sector.

International Finance Corporation (IFC): IFC is the Bank's sister institution charged with promoting capital market development and private entrepreneurship in the developing countries' industrial sectors. It undertakes its own economic analysis but also relies heavily on that conducted by Bank staff. Contact and collaboration by researchers with IFC staff is not as extensive as with other Bank staff.

Operational Support Activities: The flow of research results to the operating units is not simply in the form of papers, seminars, and various formal and informal discussions. In addition, research staff participate in operational economic analyses of individual countries at various levels: at the broad, macro level, with the Regional Programs Departments; at the sector and sub-sector level, with the Regional Industrial Development and Finance Divisions; and, at the sub-sector and project level, with the Industrial Projects Department. Our experience suggests that joint participation with operational staff in the conduct of their work is the single most effective way of disseminating research within the Bank, particularly to the extent that it has a demonstration effect on the conduct of work in which we are not directly involved as participants.

Operational support activities also include the giving of policy advice to member countries, done outside the context of the Bank's formal cycle of economic reporting and analysis. The greatest frequency of policy advising has been in the areas of development strategy and trade policy. In turn, research staff have also participated in technical assistance to member countries in the field of investment programming. Much of this assistance supports activities to identify major investment projects, some of which would ultimately benefit from direct Bank lending. Policy advising and technical assistance is done either at the request of or with the explicit concurrence of the relevant operating departments, and is closely monitored by them.

Formulators of Bank Policy: Research results are formally conveyed through two broad types of papers and complementary seminars and discussions. First, there is the stream of reports generated from each project. Except for those on development strategy, these usually reach only a narrow audience that is specifically involved with the questions that are addressed. Second, there are the policy papers in the preparation of which research staff are involved. The general audience, including staff at all levels throughout the Bank undoubtedly has its greatest exposure to research findings through reading the more broadly-focused policy papers, such as the Industry Sector Working Paper.

There is no single locus of responsibility for policy analysis, though of course decisions on policy rest with senior management and the Executive Directors, acting for the Board of Governors. Much of the policy-related work is done in the Central Projects and Development Policy Staffs, with the former tending to concentrate on the more detailed, operational aspects (e.g., methods of project evaluation) and the latter on the more general issues (e.g., development strategies among and within various sectors in different types of countries).

July 20, 1978

Policy work covers a broad range of activities from requests for the analysis of specific, narrowly focused questions through the preparation of broad-ranging assessments of development prospects and policies such as the World Development Report. Most policy work is collaborative among complementary staff units, while units not having formal responsibility for a particular task are often informally involved by being requested to provide information, comments, and other forms of support.

Formal policy work, done at the request of senior management, follows a specified and rigid time schedule. There is also some informal policy work, undertaken at the initiative of the unit(s) involved, which proceeds according to a more flexible schedule.

Technical Assistance: As noted above, technical assistance to individual member countries, including policy advising and various forms of collaboration in industrial planning, is counted under operational support activities, since it is done either at the request, or with the explicit concurrence, of the operating departments. This leaves the Economic Development Institute (EDI), the Bank's "teaching arm," as the only consumer explicitly concerned with technical assistance per se. EDI provides mid-career training to nationals of member countries, in support of institutional development that is complementary to Bank lending in specific areas. Research staff participate in EDI courses as guest lecturers and some research papers are used as course material. However, collaboration with EDI has not extended beyond this in either the trade or industry areas. (In some other areas collaboration has extended to the design and conduct of specialized courses.) In turn, there is no formal program of in-service or mid-career training in specialized areas of economics for Bank staff, though a limited number (1 or 2 per course) do attend EDI courses.

Suppliers of Research

Economics of Industry Division: This Division, consisting of ten professional staff and five research assistants, is the principal supplier of research on industry and trade in manufactures. As with all other suppliers of research, the Division's responsibilities extend beyond simply doing research to include its application through operational support activities and policy work. In addition, a substantial portion of the Division's resources are allocated to trend reporting on manufactured exports from developing countries.

Over the past four years, roughly fifty percent of the Division's manpower resources have been devoted to RPO research. Another fifteen percent has gone to trend reporting on manufactured exports from developing countries, which is of sufficient direct and immediate relevance to the operational staff that for bureaucratic purposes it is counted under operational support activity. The remaining thirty five percent of the Division's manpower resources has been allocated to more narrowly defined operational support activities (including policy advising and technical assistance on investment programming), twenty five percent, and various policy tasks, ten percent.

Most of the Division's policy work over the past several years has been in relation to issues concerned with exports of manufactures from developing countries, including questions regarding developed country policies toward these exports. Thus more than twenty percent of total staff resources have been devoted to information reporting and synthesis in this area. The remainder of the Division's policy work has been on questions of industrialization strategy.

Other Suppliers: Other suppliers of RPO research on industry within the Development Policy Staff include the Development Research Center (DRC), and the Employment & Rural Development and Public Finance Divisions of the Development Economics Department (in which the Economics of Industry Division also falls). As to areas of specialization, staff in the DRC now tend to focus on industrialization strategies and trade policies, where the Economics of Industry Division is also active. The Employment and Rural Development Division has responsibility for a major project concerned with small and medium scale enterprise development, and would be the most likely locus of any further work in this area. In turn, the Public Finance Division has several projects, formal and informal, in the areas of public enterprises and financial development. The Economics of Industry Division conducts the bulk of the rest of the RPO research on industry, including that on industrial investment analysis, which was initiated by the DRC (where there only remains one staff member actively engaged in this work).

In addition to the Economics of Industry Division, the loci of RPO research on trade include the DRC, where in addition to the area mentioned above there is work on natural resources, and the Economic Analysis and Projections Department. As previously stated, the Economics of Industry Division focuses on trade in manufactures, while the Economic Analysis and Projections Department covers all commodities as well as policies within developed countries that affect LDC exports.

Overall Staff Resources: The total number of Bank staff that should be considered as research staff working on industry and trade in manufactures is roughly twice the number contained in the Economics of Industry Division, with the other professional staff being located as follows:

- Development Research Center:
 - Development strategies and trade policy -- 2 staff members;
 - Industrial investment analysis -- 1 staff member;
- Development Economics Department Front Office:
 - Industrial investment analysis -- 1 staff member;
- Employment and Rural Development Division:
 - Small and medium enterprise development -- 2 staff members;
- Public Finance Division:
 - *Industry-related financial development -- 2 staff members;
 - Public enterprises -- 1 staff member;

- Economic Analysis and Projections Department:
*Trade in manufactures and related issues -- 2 staff members;
- Industrial Development and Finance Department:
*Various topics -- 2 staff members.

(* denotes a very rough, subjective estimate; a precise estimate is difficult owing to the arbitrariness of assigning particular work to the industry and trade in manufactures areas.)

All told, in terms of full-time equivalent professional staff, about 10 to 11 manyears are devoted to research on industry and trade in manufactures. Involved in research are at most about 25 staff members, which reflects the fact that research staff also have responsibilities for operational support activities and for policy work.

Of the 10 to 11 manyears devoted to research, only about two thirds goes to RPO research projects, the remainder being spent on "in-house" or "departmental" projects. The latter consist in large measure of studies that are preparatory to the submission of formal proposals of RPO projects to the Research Committee. For example, all current research in the Industrial Development and Finance Department is of the "in-house" variety, with work underway on several possible RPO proposals.

The resources indicated above do not include all of those involved in research on industry and trade in manufactures. In particular, Research Committee financing provides additional resources in the form of consultants and additional research assistants, as do the discretionary budgets of the units involved. (Travel and computer expenses are similarly financed.)

Information Reporting and Synthesis: In the lexicon of Bank programming and budgeting, information reporting and synthesis is not considered to be "research." Nonetheless, it is an extremely important activity in support of Bank operations and policy formulation, and a number of the research staff work in this area as well, as do some operating staff. Important loci of information reporting and synthesis include: the Industrial Project Department, which keeps global tabs on prices and installed (and prospective expansions of) capacity in major industries producing standardized products (e.g., fertilizer), and monitors technological developments in the industries to which it lends; the Industrial Development and Finance Department, which has been particularly concerned to digest external research and experience on financial development and small and medium enterprise development for internal consumption and use; the Economic Analysis and Projections Department and the Economics of Industry Division, which monitor trends in LDC trade, with the latter focusing on manufactured exports from developing countries, and trade policies, including those in developed countries which affect LDC exports (the former also monitors trends in the international commodity markets, and thereby complements the work of the Industrial Projects Department); and the International Finance Corporation, which does various small studies.

Issues in Managing Research

The preceding discussion has indicated that there are many potential consumers of research on industry and trade within the Bank, that the research staff is relatively small, and moreover that this staff is directly involved in research no more than half time. Each of the potential consumers tends to have a particular focus in the research to which it would attach greatest priority, while any given piece of research is not equally addressed to all potential consumers. That is, all potential consumers would not find any given project equally relevant to their own operational or policy-related work. For example, work on industrial investment analysis has so far been of potentially greatest relevance to the Industrial Projects Department, while research into small and medium scale enterprise development is of potentially greatest relevance to the concerns of the Industrial Development and Finance units.

A major issue in managing research is thus that the needs of all potential consumers within the Bank cannot be addressed equally at all times, except at the cost of maintaining so diversified a portfolio of research that no individual topic area would benefit from a critical mass of staff resources. This follows from the limited volume of research resources that are available, relative to the diverse, specialized interests of the potential consumers. Moreover, these interests are specialized not only along the lines that can be inferred from the first section, but also as among particular types of countries as well as individual countries. In turn, maintaining a critical mass of staff within a particular topic area is not only a question of the number and diversity of research areas dealt with, but also of establishing the proper mix between research and its application through operational and policy related work. That is, the work programs of research staff need to be designed to exploit to the fullest the externalities that can be gained by mixing research with other activities.

Nor are the operational units within the Bank the only potential consumers of research. One must also include various external communities. However, as a practical matter, research managers endeavor to undertake research that responds to internal needs, as these needs are perceived by them on the basis of formal and informal discussions with operational staff at various levels. Though diffuse, internal demands are nonetheless more readily ascertainable than are external needs. Moreover, external communities exercise an influence on the direction of research through many indirect avenues. Thus, for example, much Bank research has been of publishable quality, and it has -- if at all -- only rarely duplicated research outside the Bank.

Chief among the factors dictating that research on industry and trade should respond primarily to internal needs has been the view that it should be as directly useful in the conduct of Bank operations, including both lending and policy analysis and dialogue, as possible. As the principal criterion for the conduct of research, direct usefulness in Bank operation is admittedly vague, particularly in view of the diversity of potential consumers. The issues that remain, even given this criterion, are discussed in turn below.

Types of Research: The distinction was previously introduced between information reporting and synthesis, on the one hand, and research, on the other. This distinction in fact defines a spectrum of types of investigation that are distinguished by the degree of effort required to develop the data and/or methodology used as well as the depth of the analysis that is undertaken. It is also relevant that certain topic areas are more amenable to studies at the information reporting and synthesis end of the spectrum than are others. Various types of studies appear to have proved useful within the Bank. At one end, trend reporting in regard to manufactured exports has reached a particularly wide audience, including the formulators of policy, Program Departments, and the Industrial Projects Department and Industrial Development Finance units. It should be noted, however, that the application of the results of trend reporting to individual countries does require further work within the specific context of the particular country, to disaggregate and analyze trends with respect to that country.

At the other end of the spectrum, the more analytical studies have tended to provide an approach or methodology which can be used to attack important operational questions. Analytical research has largely relied upon the case study approach. But researchers have tended to the view that case studies alone are of limited usefulness, and that what is wanted are case studies that both develop and test methodologies which could subsequently be employed in a much wider number of cases, and which at the same time provide useful information. Examples of this type of research would include the work which Professor Balassa has directed on trade policy as well as the work on industrial investment analysis.

To refine an approach and orchestrate a series of case studies within a particular area has generally required a lengthy gestation period, depending upon the relevance of accumulated knowledge both inside and outside the Bank. The methodological focus of case study research has largely been responsible for its lengthy gestation period, though data development and analysis have also required varying amounts of time. By contrast, information reporting and synthesis provides results quite quickly.

Areas of Research: Analytical studies may be focused on various types of questions, at various levels of aggregation and generality. To date, most research has been focused upon questions of development strategies and industrial programming. In turn, research in both areas has tended to concentrate on the problems of semi-industrial countries, though there are important exceptions such as the West African comparative study and some of the work on small and medium scale enterprises.

Analytically focused research may be further subdivided by levels of aggregation and generality. The portfolio of research on industry includes work on nearly all conceivable levels, ranging from -- on the one hand -- research on economy-wide development strategies, including trade and industrial incentive policies, and multisectoral planning and forecasting analysis, using input-output methods and formalized economy-wide planning models of one sort or another, to -- on the other hand -- research at the sectoral level, under the program of work industrial investment analysis, as well as the project level. Research on general development strategy is usually of more direct

relevance across the consumers of research than is research at the sectoral or project level, which tends to address the concerns of particular consumers. This then poses another issue in the management of research.

To date there has been little formal research addressed to areas other than the two noted above -- development strategy and industrial programming. Among the other areas for which there appears to be widespread potential demand on the part of consumers are the following: enterprise management, particularly with respect to public enterprises; industrial organization, particularly as regards the role of small and medium scale enterprises and technological change; institutional development across a broad range of types of institutions, including as instances industrial extension services and financial intermediaries. (Work has begun in some of these areas, for example, on public enterprises, small and medium scale enterprise development, and institutional questions regarding channels of export marketing.)

To undertake a significant research effort in some of these areas would have immediate implications for the recruitment of research staff, since the present complement of staff tend to have specializations that are relevant for past and on-going work. In particular, the research staff includes no management specialists and is weak in the areas of industrial organization and institutional development.

Dissemination and Application of Research: Insuring the application of research results in Bank operational work has resource costs, particularly in terms of the time of both operational and research staff, that cannot be overlooked. It is implicit in the foregoing discussion that a number of the past and on-going projects have aimed to test the usefulness of methodologies that are "innovative" in the context of the Bank's operational economic analysis. Several examples can be cited in which methodologies have been found to be useful, but their application has been severely constrained by resource limitations; one instance is given by the work on industrial investment analysis. Projects that have as one of their aims to provide comparative data which can be used by operational staff also entail substantial dissemination costs; here work on the sources of industrial growth and structural change employing input-output methods provides an example, given that many Bank economists have limited familiarity with input-output analysis.

It has generally been found that successful diffusion requires a period of illustrative application by research staff (or consultants, often supervised jointly by research staff) participating together with operational staff in operational economic analysis at various levels. Indeed, most of the time spent by research staff in (narrowly defined) operational support activities is concerned with the diffusion of research results, with respect to both substantive information and methodological approaches. In turn, much of the rest of the time spent in operational support activities comes in the initial phases of a particular research project, when the researchers are working to gain operational perspectives on the questions on issues which they are investigating.

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Even the application in Bank operational work of what are now standard, accepted methods of analysis is not without difficulty owing to staff constraints. Resource requirements are illustrated by the case of recent operational study initiated and supervised by a past member of the Economics of Industry Division who transferred to the Regional staff; following the approach employed in the West Africa RPO project, roughly two manyears, including some time spent by local government officials participating in the study, was required for an in-depth and disaggregated analysis of comparative advantage and incentive policies in Cameroon. (Experience gained in this study would reduce the time required for another, if supervised by the same staff member, to perhaps as little as one manyear.)

It is one of the advantages of the approach that has been developed for appraising trade policies that estimation and analysis can be carried out at varying levels of aggregation and precision, ranging from effective exchange rates for aggregate exports and imports to highly disaggregated estimates of effective incentive measures. Crude but nonetheless robust conclusions are thus possible where resource constraints permit only limited analysis. While considerable effort is being expended to develop short-cut methods of applying more sophisticated tools in other areas, this effort has not yet succeeded to the degree that has been achieved in the trade policy area. In turn, as in recent work on Nigeria, consultants and local nationals are increasingly being relied upon to carry out in-depth analysis using approaches developed through research; nonetheless, the extension of Bank operational work in this way remains rather limited.

In short, beyond the issues of the division of research staff effort between the conduct versus the dissemination of research and between "basic" versus "applied" research, there is also an important question concerning whether some of the methodologies being developed are not so expensive to apply that the application directly by Bank staff must necessarily be sorely circumscribed. This question leads to issues regarding the use of consultants and local nationals in the conduct of operational economic analyses, which will not be dealt with further in this memorandum.

It has also been found that the use of research results, specifically substantive information and lessons of experience, in policy work also requires inputs by the research staff, who are episodically assigned to particular policy related tasks. If nothing else, the fact that individual policy tasks address particular questions and are oriented toward specific and differentiated audiences often requires that research be extended in particular directions. These characteristics always imply the need for targeted writing of the ensuing reports. Moreover, it should be noted that not all policy tasks in which research staff are involved relate directly to past and on-going research. In particular, the generation of new research proposals sometimes follows the identification through policy work of a particular topic area as being important.

Research Strategy of the Economics of Industry Division

The Division's portfolio includes a mix of types and areas of research. Areas of research are chosen on the basis of the perceived needs of operational staff, as revealed in formal and informal discussions between the research and

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operational staffs. In turn, the nature and depth of research in a particular area depends largely upon the types of questions being asked and the accumulated knowledge that can be brought to bear.

However, there has been a distinct "tilt" in this Division's choice of research topics, toward those areas in which improved methodologies can be introduced into the conduct of Bank operational work, and toward analytically grounded types of research. A large part of the Division's portfolio has been selected with a view to testing and then demonstrating the power and efficacy in operational economic work of quantitative methods of policy analysis and industrial programming. Correspondingly, there has been a conscious "bias" in favor of research that permits the use of quantitative methods in the context of operational support activity. Indeed, as noted several times above, a major means of dissemination of research results is through the participation of research staff in operational economic analyses, to demonstrate the use of particular "innovative" (at least in the context of standard Bank operational analyses) methodologies and the relevance and application of certain types of comparative data.

A specific view of the Bank's comparative advantage in research lies behind the "tilt" in the Division's choice of research topics. In short, the operational activities of the Bank provide a rich proving ground for the refinement, testing, and application of improved approaches to policy analysis and investment programming. Moreover, the close relationship between the Bank and policy makers and administrators in its member countries permits efficient diffusion of improved methods for use in developing countries.

A conscious effort is made to develop any given methodology at several levels, ranging from an approach that is "intuitively" grounded and may be applied without formal quantitative analysis, to a mode of precise formal analysis, usually quantitative. This has motivated the assembly and analysis of comparative data concerning development strategies under a number of projects, the perception being that any methodology is of greatest usefulness if complemented by a body of comparative data collected within the framework of that methodology. A similar approach has been applied in work on industrial investment analysis, though here the aim has been less to assemble comparative data than to provide simpler means of assembling information for use in informal (as well as formal) analysis.

The following sections of this memorandum discuss those RPO projects that are currently underway.^{1/} Since the aims, content, and uses of those projects that focus particularly on incentive policy issues are relatively well known, the discussion concentrates on the remainder of the Division's portfolio. Projects are classified into broad areas according to the classification scheme being used by the External Panel.

^{1/} The Division has also participated in, and in some cases directed, several of the completed projects, but these will not be discussed here.

Incentive Policies: RPOs 670-01, 670-87, 671-10; and

Market Access, Export Promotion Measures: RPOs

671-35, *671-56 (Export Marketing),
*671-68 (Key Institutions).^{1/}

Within the Division work on trade in manufactures has proceeded on four fronts. First was the application of quantitative methods to the assessment of industrial incentive policies within developing countries; this work has throughout been under the direction of Prof. Balassa, with Division staff conducting some of the individual country studies within each comparative project. In addition, this Division has been the largest source of research staff participation in operational economic analyses of trade policy and development strategy. Division staff have conducted policy assessments and/or advised on policy and development strategy in a number of countries, including at least one in each of the regional areas.

To complement research and advising on policies affecting the supply of manufactured exports from developing countries, trend reporting on manufactured exports was later initiated, and shortly thereafter the investigation of the policies of developed countries toward exports from developing countries was added. In both respects, information has been synthesized and then analyzed for particular classes of manufactured goods. Among the latter are included textiles and non-electrical and electrical equipment. In addition to producing reports for general use within the Bank, the staff have consulted with operational staff working on a large number of specific countries, to assist in relating global trends to evaluating and advising with respect to particular countries.

The fourth front has just recently been added and is concerned with institutional issues in regard to the marketing of manufactured exports. Surprisingly, very little is known concerning the marketing channels through which the rapid growth of exports from countries like Korea and Hong Kong has taken place. With an eye toward developing a base of information for policy advising within individual countries, the Export Marketing and Key Institutions projects seek to uncover the modes of export marketing in Colombia and in several successful East Asian exporters. The research on Colombia includes a focus on the organization of exports from small scale enterprises.

Comparative Advantage, Trade Patterns, Economic Growth: RPOs

*671-05 (Patterns), *671-32 (Sources I), *671-79 (Sources II).^{1/}

The allocation of resources among sectors within industry has been investigated both descriptively and prescriptively. The Patterns project has assembled a mass of comparative data on the structure of industry -- at the 2-digit ISIC level and below -- and related variables across a large

^{1/} * indicates that the project is directed by staff within the Division; in parentheses is given the project "label" which is used in the discussion in the text that follows.

number of countries and for individual years from 1950 through 1974. These data are now being analyzed to uncover uniform patterns of evolution in industrial structure across a variety of country types, distinguished among other features by the development strategy being followed. The aim of this work is to provide statistically estimated structural norms with which the industrial structure of individual countries can be compared, this being felt to be a more satisfactory means of placing one country's industrial structure within a comparative framework than is the direct comparison of that country with one or at most a few others that are in some sense comparable. (Nonetheless, the data to compare individual countries are readily accessible.) With inputs from the Division, the approach has been used in Bank economic work on several countries, the most recent being an analysis of electricity consumption patterns in India. In turn, this project may be extended to conduct a similar analysis of patterns of trade.

The Sources I project covers a much smaller number of countries and investigates the structure of industry in greater detail, using input-output data. Moreover, it focuses explicitly on uncovering the sources of structural change from the demand side, including the growth of domestic demand, net trade, and intermediate input use, and attempts to relate these sources to industrial policies in the countries studied. In addition to providing comparative data on industrial structure and the sources of its change over time, this project has served to develop the capability for and to "publicize" the use of input-output analysis. Division staff have employed input-output analysis in operational work to analyze the development plans of Korea and Yugoslavia.

Just started, the Sources II project continues the work started under Sources I. The overriding objective remains the same: to refine and test a methodology which can be applied more or less uniformly across a variety of countries, and to do so in the context of comparative research which provides an initial base of comparative information. The specific aims of the Sources II project are, first, to include the analysis of sources of growth on the supply side (i.e., increases in factor productivity) within a framework that embraces both demand and supply factors; second, to extend the input-output analysis to the formal specification and use of computable general equilibrium models, in part to permit a quantitative evaluation of the efficacy of price policies as instruments affecting trade and development performance; and, lastly, eventually to incorporate individual sector studies within the same framework.

The Sources II project is expected to have a number of ramifications for operational economic analysis. The most immediate is the ability to implement multisectoral planning models for analyzing industrial development programs. The class of models being used permits the explicit incorporation of price policies, which marks a major improvement over input-output or linear programming approaches. Such a model has just been implemented for Turkey, and is being extensively relied upon by operational staff in the regional Program Department concerned with the Bank's activities in Turkey. One of the central issues in the particular application is the determination of an appropriate exchange rate, where the consequences of exchange rate policy for individual sectors are felt to be particularly important to the analysis.

The project marks the Division's first foray into the investigation of total factor productivity growth within industry. To start with, work on this topic will be descriptive, to develop in-house expertise in the measurement of total factor productivity growth and to gain experience in its application. Finally, the ultimate inclusion of individual sector studies has the objective of deepening our understanding of the importance of policies and the behavior of institutions at a detailed level that is not possible in an industry-wide, multisectoral analysis. It is, however, felt to be important to conduct these sector studies against the background of a multisectoral approach.

Industrial Programming: RPO 670-24

Investment analysis is also carried out at the sectoral and project levels, as described in the paper "Industrial Investment Analysis: An Overview of Research and Applications," by A. Meeraus, Y. Rhee, A. Stoutjesdijk, and L. Westphal, July 1978. This paper should be consulted for details concerning the purpose, content, and results of the program of research in this area.

Capital-Labor Substitution, Technological Change: RPOs

*670-23 (Scope for Capital-Labor Substitution in Mechanical Engineering), *671-59 (Appropriate Industrial Technology).

Work at the project level in the non-process industries, under the Scope for Capital-Labor Substitution in Mechanical Engineering project, grew directly out of research on industrial investment analysis, and has been particularly concerned with the choice of technology, with reference to textiles and capital goods production. The work done on these industries reflects a general concern with the causes and consequences of the choice of technology, which concern has been further pursued under the Appropriate Industrial Technology project.

The latter project is in two phases, the first of which is nearly complete. The purpose of this phase has been to get some fix on the potential importance of choosing appropriate technologies in respect of the attainment of development objectives, to appraise the factors leading to the inappropriate choice of technologies, and to consider possible strategies for the Bank in this area. The strategy that has received greatest attention is increased lending to the capital goods sectors of developing countries.

The second phase stems from a lesson learned in providing operational support during the first. Division staff were asked to comment on the choice of technology in a textiles project to be financed by the Bank in a particular African country. Their evaluation concluded that the choice of technology was inappropriate, being too capital intensive and perhaps too large scale as well; in the latter respect it was suggested that consideration be given to breaking the one project into a number of smaller projects, to permit greater spatial dispersion of textile production. To make a long story short, in the end it was agreed between the research and the operational staff that the appropriate

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choice of textile production technology could not be definitively settled without further work, to bring the conduct of research on choice of technology closer to the conduct of operations. Thus the second phase is a joint project between these staffs, to conduct a case study in the evaluation of technological choice.

As noted previously, there has been very little research in the Bank directed toward issues of technological change, while the Sources II project will initiate comparative investigations of total productivity changes. In our view, work on technological change must also emphasize institutional aspects, to a far greater degree than has previous work on resource allocation. Effort is proceeding in two directions.

Small-scale Industry: RPO 671-59

First, and furthest developed in explicit terms, one of the Division's staff is working on the small scale industry research project, with a primary emphasis to uncover the sources of technological information used by small and medium scale enterprises in Colombia. The aim is to discover which market agents, including suppliers of raw materials and capital goods as well as purchasers of output, provide technological information and how effective are their activities in this regard. The working hypothesis is that to improve access to technology, it may be more efficacious to deal with existing information channels than to establish new technologically oriented institutions.

The second direction of work on technological change is only now emerging from our previous research on industrial investment analysis, and its concern with interdependence, or -- in other terms -- external economies. From this work we have learned that the organization of production among plants can have a very pronounced impact on the cost of supplying fixed demands, in other words on total factor productivity or x-efficiency. This lesson has most clearly emerged in analyzing the scope for factor substitution within the mechanical engineering industry, where patterns of subcontracting and the sharing of processing facilities among products are particularly important. The organization of production among plants and firms is clearly an institutional phenomenon, the analysis of which will lead us beyond those factors which are prominent in the previous work on industrial investment analysis.

Summary: While the Division's work program entails a number of facets, the guiding analytical framework is that of "multi-level" general equilibrium analysis. The models of multi-level planning that have been articulated in the literature serve as a starting point for this framework, but the Division's research is more aimed at policy analysis than at planning per se. In particular, considerable effort has already been expended to focus on policies, primarily price denominated incentive policies, rather than merely on resource allocation. In turn, efforts are now underway simultaneously to deepen and broaden the approach to include institutional phenomena. The focus of this effort is the Division's new work on export marketing, sectoral studies under the Sources II project, and technological change, the latter with the probable cooperation of Charles Cooper at the University of Sussex. Moreover, we are not wedded to the use of quantitative

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"planning" models, though quantitative analysis will remain the pre-eminent type of research. Equally, at least for a long time to come, no effort will be made formally to link the analyses at the various levels.

From this perspective, highest priority in the Division's further research work must go to completing research projects now underway, so that the approach being taken can be articulated for more widespread understanding within the Bank, and to extensions that appear warranted. Equally, the effort to insure the application of results in Bank operation work must continue. Most of the Division's contact with operational work to date has been through the regional Program Departments and the Industrial Projects Department, and new modes of cooperation will have to be developed to pursue involvement with the other operating units within the industrial area.

Areas for Research on Industrial Development

1. This memorandum is intended to help focus discussions on areas that merit attention in further research on industrial development by the Bank. The External Panel on Research in Industry and Trade may find it useful as an indicator of some of the topics that are being considered by the Industry and Trade Research Steering Group that has recently been established to review research programs in these two related fields. The Steering Group proposes, following initial discussions with the External Panel, to prepare a more detailed outline of a near-term future research program in these fields.
2. This memorandum should be read in conjunction with review of the status of on-going programs, with which the future programs may have strong linkages. Also suggested herein are some additional topics or lines of investigation that are becoming more important in the Bank's work and that have not been adequately covered.
3. The focus is on topics in industry. Consequently, this memorandum may be regarded as a companion piece -- with a different orientation and coverage -- to the memorandum entitled "Medium Term Work Program in Trade and Commodities."
4. In order to avoid a long, indigestible list of individual topics, among which it may be difficult to reach any consensus on priorities, a smaller number of topical "families" are identified below. Each family may include a number of individual topics that are closely related, and it is not necessary at this stage to attempt exhaustive identification of specific topics. The order of presentation of the topical families does not imply anything about priorities.
5. A point of general concern affecting all the topics listed below is the question of the basic orientation of the Bank's research in industry. The four main objectives stated in the terms of reference of the External Panel include, inter alia, "to support all aspects of Bank operations . . ." and "to broaden our understanding of the development process." In order to meet these objectives the research program will necessarily involve a mix of work on innovative methodologies as well as work of immediate relevance to specific operational problems. The time required to develop new methodological approaches and to perceive operational "payoff" may be lengthy. Ultimately, however, all such work must be related and of value to the stated objectives of the research program, and in areas where the Bank has a comparative advantage over academia. This relationship needs to be continuously reviewed, its definition refined, in order to avoid a widening gap between researchers and their work on the one hand and the practitioners in the Bank's project and industrial policy work on the other, and worsening of the already dissemination problem. At the same time, due attention must be given to meeting the research needs that emerge from the practitioners' day-to-day work and problem solving attempts. The staffing and organization of research should be such as to enable research staff to work closely with the operational and sector departments and have a participatory role in the Bank's industrial operations and policy dialogue.

The formation and composition of the Steering Group was intended to reflect this necessity, and to take account of the range of questions and options it poses in considering research priorities; the External Panel is urged to do likewise.

A. Industrial investment strategy and policies in selected country situations.

6. The variety of country situations calls for different designs of industrial growth paths and policies to support them. The following categories are illustrative of differentiations that can be made; in-depth case studies could be undertaken to illuminate familial differences and to provide operational guidance.

- (a) Countries rich in material resources (e.g., Venezuela, Iran, Indonesia). Resource based industries may be used as the springboard for development but must be linked to other downstream and supporting activities, and to expansion of exports.
- (b) Non-industrial economies (e.g., Burma, Cameroon, Paraguay), which are just beginning the process of industrial development; attention must be given to the relative importance of policy tools, incentives, management and labor training, the role of private foreign investment, and the sequence of import substitution and export development. Research project could take off from work done on basic mission to Tanzania and current sector work in Cameroon.
- (c) Sub-Saharan Africa. While similar in some respects to countries in category (b) above, this group of countries may deserve separate treatment for various reasons. High wage levels may inhibit development of labor-intensive export industries. Dominance of private foreign investment in Africa may have a great deal to do with the dualism of these economies, use of inappropriate technologies and the stunting of small scale enterprise. A comparative study on wage rates and labor productivity would throw more light on this problem, and on reasons for their divergence; this needs further exploratory work and preparation of a research design. A review of the literature on (i) the impact of private foreign investment on African economies, and (ii) the relevant policy frameworks of African governments should be undertaken initially; a great deal has been written but there is little evidence, in sector policy or operational decisions, of its absorption by Bank staff. A systematic review would enable us to take stock of what is known, and to define more correctly the subjects requiring further research.

7. Other patterns might be the export-oriented East Asian countries, the import substitution pattern which has characterized South Asia in the past (although now changing to some extent), and the Latin American propensity and adaptation to inflation. All have been studied, more or less intensively -- more than those in para 6 above -- but there is continuing need to relate the findings of these studies to other regions and situations (as in para 6).

B. Employment enhancement through industrial development.

8. This topic clearly is important in the context of the Bank's concern for alleviating urban and rural poverty and its emphasis on creating not just more jobs but more productive (i.e., higher paying) jobs, since solutions are supposed to be efficient and not simply welfare systems. Papers by J. Stern made a beginning on this problem, and highlighted the significance of both direct and indirect effects, and the wide differences in this regard among various industrial subsectors. The second Stern paper also explored the implications of employment effects in countries at various stages of development. Specific research topics that result in improved methods of measuring or enhancing employment through industrial investment, or that bear on the choice of industrial subsector priorities or mix, or that affect the design of projects, etc., would be much to the point.

9. One important sub-family of topics is the employment (and other) aspects of small and medium scale enterprises (SME). Their problems are often thought to be so special as to constitute a separate genus. Are they efficient users of factors? In what industries or activities? How can efficiency be enhanced? What special incentives or technical and technological assistance do they need? What mix of small and large scale industries is effective, and how do they interact, in complementary or competitive ways? More broadly, what is a proper balance between capital-intensive and labor-intensive industries in countries at different stages of development and with different size and population characteristics? What are the implications of large scale, capital intensive patterns of industrial investment for indigenous entrepreneurship, finance, business organization and technology? These are some illustrative issues.

10. There is need for a more systematic analysis of institutions supporting SME development -- for technology, management, marketing, export promotion, product design, etc., as well as various kinds of finance. What could be done almost immediately is a summary of Bank experience in SME support, including criteria for judging institutional effectiveness, analytical descriptions of those support systems which are regarded as particularly strong, and possible means for closer linking of technological assistance with project appraisal in Bank DFC lending with a view to taking greater account in such lending of capital saving devices and processes. The modalities of rural industrialization may require separate analysis: the nature of industries suitable for rural resource endowments and markets, linkages with agriculture, infrastructure requirements, policies and institutional framework, etc. The case study approach that has often been used (e.g., 671-59) may have to be supplemented by other approaches to this problem.

C. Developing the technological base.

11. Many countries, particularly those classified as semi-industrial, are increasingly interested in developing their own technological capabilities, reducing dependence on licenses and enhancing their adaptive capacity. Technological assistance to small industry, to be effective, may have to be linked to R&D activity of a simpler character, especially in smaller or poorer countries. Some specific projects are in process of discussion and design, and a few have been approved and are being implemented. Moreover, in industrial sector work more attention is being given to this topic. For example, work on the engineering industries is being stressed because they may have many desirable characteristics (e.g., they tend to be efficient at small scale; they tend to be labor-intensive; the demand is highly income elastic; they have strong backward and forward linkages; there are definite export possibilities; and they are an important "carrier" for technological change). These characteristics need to be more fully demonstrated and conditions for successful projects established through research in depth on the policies, institutions, and methodologies for strengthening indigenous capabilities in countries at different stages of development.

12. Possibilities of labor-capital substitution are under study in the mechanical engineering industry, with special reference to African conditions (Phase II of R671-51). Depending on the outcome of these projects, further studies of possibilities of improved project design in selected industries may be indicated.

13. It is recognized that research on technology will require close collaboration between engineers and economists, will have to be product and industry specific, and possibly be conducted in a sequential manner. Hence, we cannot expect to mount a large number of projects in this area. Our main object would be to influence the processes of project preparation and industrial planning by paying more explicit attention to the technical feasibility of capital-saving devices and processes.

D. Financial systems and industrial development.

14. There is considerable interaction between the availability of finance and the pattern and direction of industrialization. Several topics involve issues that affect Bank operations and hence may deserve attention. The Bank has a long history of lending to financial intermediaries. A fresh look is needed at the relationship between the growth of these entities (and also capital market and venture capital institutions) and industrial growth requirements. What kinds of specialization are called for? What strains and problems arise at various stages of expansion and diversification? What are instruments and conditions for success? What alternative sources of finance (foreign and domestic) are available? What incentives and policies will stimulate the right kind of financial sector development? How should future Bank programs aim to foster such development?

E. Programming models in industry.

15. This work got off slowly and has had success in the Egypt fertilizer model, the S.E. Asia and India models; it is in danger of being terminated for lack of wide recognition of its potential practical application. There is a whole "cascade" of modelling work that needs to be pursued: investment planning in a sector for a country; allocation of output within firms in the industry (the locational aspects are important); planning output within the firm; linking sector models to obtain an economy-wide model; inter-country locational models for investment and output planning. A continuing effort is needed to avoid losing momentum. (See 670-24.)

F. Structure and patterns of industrial growth among countries.

16. This topical area has received a great deal of attention in the Bank, most notably in project 671-05. Another "round" of activities recently approved, involving special case studies on Turkey and Korea, will use a newer and modified data system and will pursue prior country results to investigate comparisons in several dimensions. Questions of a similar kind also arise in the context of Bank operational work.

17. Decisions to support specific projects by the Bank are made primarily on the basis of calculations internal to the project and the country (e.g., economic and financial rates of return). But increasingly there is awareness that in counseling several countries to pursue (or not) projects in textiles, pulp and paper, fertilizers, shoes, steel, etc., a global (or at least a regional) framework and consideration of dynamic changes are really required. Also the locational aspects of new investment have been brought up, specifically by the UNIDO Lima targets; the FAO has been conducting studies of the phased development of world pulp and paper resources, and the subject is receiving increasing attention in various other contexts. In order to have a solid basis for recommendations on industrial strategy, the Bank should undertake research on the relative development and locations of investment in selected intermediate goods (as indeed it does now on a limited basis); but, more importantly, the research should investigate questions such as: What are the gains and losses in trade and market control? Will the locational shifts lead to greater or lesser efficiency? What are the implications for investment criteria and finance? What are appropriate Bank responses and approaches in supporting specific projects in these products?

G. Export potential and promotion of industrial goods.

18. This topical area provides the best example of overlapping interests in industry and trade. Extensive work has been done in the past, notably on trade incentive systems, and further work is outlined in the memo on the work program for trade and commodities mentioned previously. This research has now reached a stage where it can be applied to particular country situations, as a basis for assessing or devising specific operational policies/programs for export promotion. The scope

of the work will have to be tailored accordingly. We have the West African studies (DRC) at one end, and the Turkey and Portugal examples at the other. Several other countries will require fresh attention. We should also assess DFC lending as a tool of export development, with a view to making it more effective.

H. Policies and programs affecting public sector enterprises.

19. Increasingly Bank sector missions undertake to review the performance of public enterprises and suggest policy and institutional changes to improve their efficiency. Public enterprises cannot be judged on the same basis as private firms, and we need to develop an analytical framework adequately to tackle this problem. Our capability to provide policy advice in such areas as pricing and product mix, incentive and control mechanisms, financial policies and socio-economic environments needs to be strengthened. Another key area is the institutional framework for managing and controlling public sector enterprises -- what forms are appropriate under different political and administrative contexts, e.g., holding companies as in many Western European countries or a Public Enterprise bureau as in India.

J. Investment appraisal methodology.

20. The acquisition and processing of data for shadow pricing and effective protection or domestic resource cost calculations can be time consuming and costly. Exploration of short-cuts and "second best" methods to determine how close they come to full-system results, how sensitive they are, how much time they actually save, etc., would potentially be of significant benefit to the project analyst.

K. Studies undertaken in context of DFC and industry lending.

21. There are relatively few such studies (certainly less than, for example, in Education or Rural Development) but in a number of cases, in different countries, they clearly relate to our operational concerns, e.g., textile sub-sector, characteristics of small industry sub-borrowers, trade incentives and functioning of financial markets. There is need for a more systematic review of what exists and of the potential for focussing the attention of borrowers on key issues in their country context. More Bank staff support in starting the studies, and in reviewing their implications and usefulness, would doubtless be required to do this effectively, and this may be a bottleneck; but effective use of these external resources should certainly be economic in the longer run.

July 13, 1978
IDFD

A Medium-Term Work Program in the Trade and Commodities Area

Bela Balassa

1. The purpose of this report is to formulate a medium-term (3-4 years) work program in the trade and commodities area. In formulating such a program, the basic question to be answered is what the Bank needs to know in this area. The report will examine topics of interest to the Bank, followed by a discussion of suggested priorities.
2. The first necessity is to monitor trends in international trade and to analyse future prospects as regards export volume and prices for major commodities as well as for individual developing countries. Export prospects will depend on a variety of factors, including objective conditions affecting supply (the availability of natural resources, unskilled, skilled and technical labor, and managerial knowhow) and demand (changes in income and consumption patterns); the policies followed by the developed and the developing countries; and the institutional framework encompassing the existence of transportation and communication facilities, marketing channels and the role of multinational corporations. Apart from examining the effects of these factors on exports, one needs to ascertain the impact export growth has on particular policy targets such as economic growth and employment. This, in turn, calls for an evaluation of alternative policies, including the choice between export orientation and import substitution in the developing countries and the choice between a liberal and a protectionist trade policy in the developed countries.
3. Bank work in the trade and commodities area consists of data collection and analysis, the preparation of issues and policy papers, and research. These will be considered under various subject headings below. The Appendix contains a listing of ongoing and planned RPO and non-RPO studies which are referred to

by title and by number in the text.

Trends in International Trade

4. The International Economy Division and the Commodities and Export Projections Division of the Economic Analysis and Projections Department (EPD) prepare world trade matrices, analyze trends in the trade of the developed countries, developing countries, and centrally-planned economies, and review developments in the exports of primary commodities. The Economics of Industry Division of the Development Economics Department (DED) examines trends in the manufacturing trade of the developing countries.

5. EPD prepares annual reports under the title "Commodity Trade and Price Trends." A separate report is prepared by DED on trade in manufactures. In order to ensure greater comparability, the increased cooperation of the two departments would be desirable and the marging of their reports should be envisaged.

Commodity Work

6. Data collection and analysis, leading to forecasts of the export volume and prices of major primary commodities, is carried out by the Commodities & Export Projections Division. Progress has recently been made in formalizing work in the form of models and in ensuring the consistency of country forecasts for individual commodities.

7. Work on international trade in foodgrains continues in collaboration with the Agricultural Projects Department. Further work in this area could be usefully done, focusing on the economic effects of national and regional selfsufficiency in foodgrains and on possible implications for foreign aid and the government budget. An in-house study of energy policies of the developing countries carried out in collaboration with CPS, is under way and will lead to the preparation of an issues paper (2.3).

8. The Commodities & Export Projections Division covers processed foods, minerals, and forest products as well. Work on other manufactured goods has begun in the Economics of Industry Division of the Development Economics Department (DED). In-house studies on electronics and electrical machinery (2.5), textiles and clothing (2.6), and non-electrical machinery (2.7) are in preparation.

9. With the growing importance of manufactured goods in the exports of the developing countries, work on trade in the major commodity groups of interest to these countries would need to be carried out on a continuous basis. The commodity groups in question include textiles, clothing, shoes, electrical appliances, non-electrical machinery, electronics and transport equipment, all of which are actual or potential exports of the developing countries.

10. Among intermediate products, steel, petrochemicals, fertilizer, and pulp and paper offer interest to the developing countries from the point of view of exports and import substitution as well. In the case of these industries, the first priority is to consolidate information on new investments, together with demand projections, in a model framework, so as to serve as a guide for Bank investments and policy advising.

11. More generally, work on manufactured goods should aim at indicating changes in the structure of world industry and to serve the Bank in performing its policy advisory role. This would require an initial period of the accumulation of knowledge, where use needs to be made of information collected by UN agencies and other organizations. While work on manufacturing industries would need to be phased in over time, even a modest beginning would require an increase in available staff. At the same time, staff needs in DPS will depend on the

division of labor with other Departments that have done work on certain intermediate products in the past.

Commodity Agreements and the Integrated Program

12. Issues relating to commodity agreements were considered last year in a paper by Dragoslav Avramovic and Karsten Laursen. In turn, the gains and losses, and their distribution between producers and consumers, that may result from price stabilization agreements and cartels are being studied under alternative assumptions in RPO 671-09, "Natural Resources and Planning: Issues in Trade and Investment" (1.4).

13. It would further be desirable to investigate the existing system of marketing primary commodities and the implications of this system for the distribution of benefits among producers, traders, and consumers. This may take the form of analyzing the economic implications of the UNCTAD study on cocoa; associating the Bank with the UNCTAD study on tea; or carrying out work on hard fibers.

Patterns of Specialization

14. Investigations of the impact of objective conditions on the pattern of international specialization and on changes in this pattern are of interest for gauging prospective changes in the export composition of developing countries. In RPO 671-05, "Patterns of Industrial Development," broad changes in the composition of trade in manufactured goods are investigated (1.3). In turn, "A 'Stages' Approach to Comparative Advantage" (World Bank Staff Working Paper No. 256) has examined the relationship between the accumulation of physical and human capital and the composition of manufactured exports. Further work would need to be done on the sequencing of trade patterns for countries that presently rely chiefly on primary exports.

15. Studies planned by the Commodities & Export Projections Division on the processing of primary export commodities (2.1) and on the export diversification prospects of the smallest and the poorest developing countries (2.2) would respond to this need. The former would take the form of in-depth studies of selected commodities to analyze the potential gains from processing and the obstacles to the further transformation of raw materials and foods in primary-producing countries; the latter would consist of in-depth studies of representative countries, where the exportation of primary products or manufactures offer possibilities.

16. It would be of further interest to analyse the sequencing of exports in natural resource-rich countries. Country studies may be devoted to the prospective transformation of the export structure of oil-producing countries, such as Iran or Venezuela, and of middle-income countries in whose exports primary products predominate, such as Kenya and Peru.

Developing Country Policies

17. The trade policies followed by developing countries that have established an industrial base are analyzed in RPO 670-01 "Development Strategies in Semi-industrial Countries" (1.1). The findings of this research project have been incorporated in "Export Incentives and Export Performance in Developing Countries: A Comparative Analysis" (World Bank Staff Working Paper, No. 248), which examines the relationship between export incentives and exports as well as between exports and economic growth in countries that followed different policies. Country experiences with export promotion are summarized in RPO 671-10, "Promotion of Nontraditional Exports" (1.5) while incentives and costs in export activities are investigated in RPO 671-35, "Export Incentives in Developing Countries" (1.6).

18. Additional research on trade policy in countries that have established an industrial base is likely to bring diminishing returns. However, interest attaches to studying the efficient sequencing of import substitution and exports in particular industries and the policies aimed at manufacturing growth in non-industrial countries. The skill-acquisition process in metal manufacturing offers an example of industry studies. In turn, among non-industrial countries, Tanzania may be an interesting subject for a case study that could also consider the implications of the basic needs approach to international trade. A study of Tanzania would complement RPO 670-87, "Industrial Policies and Economic Integration in Western Africa", which provides estimates of incentives and domestic resource costs on a firm-by-firm basis for Ghana, Ivory Coast, Mali, and Senegal (1.2).

19. Finally, there is need for keeping trade policy issues in the developing countries under review for purposes of operational support. This would involve a continuing review of the treatment of export subsidies by the developed countries as well as participation in country missions. The Economics of Industry Division of DED appears to be the appropriate place for this work.

Intra-LDC Trade

20. A particular aspect of trade policies in developing countries that needs to be studied relates to intra-LDC trade. Topics of interest include experience with past integration schemes, in particular the economic effects of agreements on industrial specialization in Latin America; future possibilities for regional integration by the use of tariff preferences and by the establishment of integration projects; and the benefits and costs of preferential treatment to inter-regional trade among LDCs in the framework of collective self-reliance. A work program in this area could be determined following

the completion of an in-house investigation by EPD, leading to the preparation of an issues paper (2.4).

Institutional Factors

21. It has been alleged that the expansion of intra-LDC trade has been hindered by the lack of adequate transportation and communication facilities. This hypothesis may be tested by comparing freight rates and the cost of communication between various points in developed and in developing countries. At the same time, one would need to evaluate the costs and benefits of establishing transportation and communication facilities linking developing countries.

22. In the framework of RPO 671-35, "Export Incentives in Developing Countries" (1.6), information is also collected on marketing channels for exports. In turn, RPO 671-56, "Marketing Manufactured Exports" (1.7) examines the role of marketing in the development of Colombia's textile exports. Further work has been suggested in the framework of the proposed RPO on "Key Institutions and Expansion of Manufactured Exports", (1.8) which would consider the role of trading companies, foreign buyers, and multinational corporations in export marketing.

Developed Country Policies

23. The prospects for LDC exports depend to a considerable extent on the policies followed by the developed nations. Policies concerning the imports of primary products have been adequately studied; policies pertaining to the processing of primary products will be considered in the in-house study referred to above; non-tariff barriers to LDC exports of manufactured goods in the United States and Western Europe are being reviewed by consultants; and the in-house study on LDC exports of textiles will examine the effects of the

international textile agreements on these exports, in particular the shifts in the sources of supply that have benefited developing country exporters.

24. It would further be desirable to analyze the market constraints facing developing country exporters of manufactured products in the developed nations. In this connection, it has been suggested to reorient the research project proposed by Professor Baldwin, "Industry and Regional Effects of Increased Imports of Manufactured Goods from Developing Countries" (1.9), so as to focus on the question of market penetration by developing country exports in U.S. markets for manufactured goods. In particular, one would need to establish "danger points" that trigger protectionist pressures and, eventually, protectionist measures. Further consideration would need to be given to the replacement by developing country producers of developed country suppliers in U.S. markets and to the international division of the production process through the manufacturing of parts, components, and accessories in developing countries in which case the danger of protectionist reactions is minimized.

25. Work along these lines needs to be undertaken also for Western Europe and Japan. For Western Europe, this can be done in the framework of the research program proposed by the Brussels Centre headed by Jean Waelbroeck (1.10) to be carried out in cooperation with the Kiel Institute. It would be desirable that a parallel research project be undertaken for Japan, with emphasis on resistance to market penetration by developing countries and on changes in the international position of the Japanese textile industry.

Projecting the Exports of Developing Countries

26. A consistency framework for making medium-term export projections, incorporating trade matrices for five commodity categories and 15 regions has been constructed for purposes of the World Development Report by EPD. Future

projection work should focus on the manufactured exports of the developing countries, utilizing the results obtained in the industry studies. It would be of further interest to examine the impact of increases in the exports of the developing countries on their imports from the developed nations, in particular on their manufacturing industries (1.11).

27. Prospective changes in the manufactured exports of the developing countries are related to the changing pattern of comparative advantage as noted above. The better understanding of this process would be served by explicit modelling. Work on such a model is proposed by the Brussels Centre, but would require close cooperation with the Bank.

28. Emphasis has been given here to the need for projecting the manufactured exports of the developing countries on the basis of an analysis of the prospects for individual commodities and commodity groups. This approach is superior to making projections on the basis of past relationships between income growth in developed countries and the exports of manufactured goods from developing countries, since these exports have been affected to a considerable extent by the policies followed in the latter group of countries. Nor does the simultaneous estimation of demand and supply functions hold much promise. Such estimation gave poor results for Japan and Korea, in part because of the unreliability of export price indices.

29. However, it would be of interest to examine the cyclical pattern of this trade, in particular the effects of the 1974-75 recession and the expansion that followed on the exports of manufactured goods from the developing countries (2.8). This could subsequently be the subject of an issues paper.

Priorities for Future Work

30. Pursuing all topics of interest to the Bank in the trade and commodities area simultaneously would involve a very substantial effort. It is, therefore, necessary to indicate priorities for work to be carried out in the next 3-4 years. Priorities should be determined with a view of the Bank's operational needs in the trade and commodities area. It is suggested here that emphasis be put on the future possibilities for expanding LDC exports and on the policies necessary for export expansion.

31. This would require complementing ongoing work on primary commodities by work on manufactured goods of export interest to the developing countries, the aim being to examine the transformation of the structure of world industry, to assist the Bank in performing its policy advisory role, and to provide support to Bank investments in the manufacturing sector. These objectives would be served by establishing appropriate staff functions, supported and complemented by research. In particular, there is need for an initial accumulation of knowledge in the form of industry studies; an investigation of the market constraints facing developing countries in the developed nations; and a review of the policies followed by the developing countries themselves.

Listing of Bank Studies and Papers
in the Trade and Commodities Area

	<u>Title</u>	<u>Responsibility</u>	<u>Completion Date</u>
1.	<u>Research Projects (RPO-s)</u>		
1.1	670-01 Development Strategies in Semi-industrial Countries (Argentina, Colombia, Israel, Korea, Singapore, Taiwan)	DRC, Balassa and consultants	Jan. 1978
1.2	670-87 Industrial Policies and Economic Integration in Western Africa	DRC and DED, Balassa, Pursell, Shepherd and consultants	June 1978
1.3	671-05 Patterns of Industrial Development	EPD, Prakash	June 1978
1.4	671-09 Natural Resources and Planning: Issues in Trade and Investment	DRC and DED, Blitzer, Stoutjesdijk and consultants	June 1978
1.5	671-10 Promotion of Non-traditional Exports	LAC, Greene and consultants	March 1977
1.	671-35 Export Incentives in Developing Countries	DRC and DED, Balassa Papageorgiou, Pursell and consultants	June 1979
1.7	671-56 Marketing Manufactured Exports	DED, Morawetz (cons)	December 1978
1.8	(proposed) Key Institutions and Expansion of Manufactured Exports	DED, Keesing, Dervis	June 1979
1.9	(proposed) Industry and Regional Effects of Increased Imports of Manufactured Goods from Developing Countries	EPD, Baldwin, consultants	December 1979
1.10	(proposed) Manufactured Exports Module	EPD, Waelbroeck, consultants	to be determined
1.11	(proposed) Impact of Developing Country Growth on Economies of Developed Countries	Waelbroeck, consultants	to be determined

	<u>Title</u>	<u>Responsibility</u>	<u>Completion Date</u>
2.	<u>Non-RPO Studies</u>		
2.1	Processing of Primary Commodities	EPD, Takeuchi and Chung	October 1978
2.2	Export Performance and Diversification Prospects for the Smallest and the Poorest Developing Countries	EPD, Singh	June 1979
2.3	Energy Policies in Developing Countries	CPS, EPD, Hoffman Friedmann	October 1978
2.4	Intra-LDC Trade	EPD, DED, Laursen, Keesing	June 1978
2.5	Developing Country Exports of Electronics and Electrical Machinery	DED, Plesch	November 1977
2.6	Developing Country Exports of Textiles and Clothing	DED, Keesing	December 1977
2.7	Developing Country Exports of Non-electrical Machinery	DED, Kanaguchi	January 1978
2.8	Sensitivity of LDC Exports to Business Conditions in Developed Countries	EPD, Schwartz and Grilli	May 1978

OFFICE MEMORANDUM

TO: Dr. Jorge Cauas, Chairman, Transport Research Review Commission DATE: July 5, 1978
FROM: Christopher R. Willoughby, Director, TRP *CRW*
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 Commission (TRRC) 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 of the most relevant publications and other documents for review by TRRC. 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.

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?

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)

Review of Research in Energy, Water and Telecommunications

Terms of Reference for Panel

A. Introduction

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:

- choice of research topics,
- the way in which the research has been conducted,
- operational relevance of the results,
- lessons for future research efforts.

B. Guidelines for Evaluation

The objectives of the Bank's Research Program 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 research program of the Energy, Water and Telecommunications Department 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 are suggested as an organizing format for the report on the panel'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 development issues?

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?

C. Composition of Panel

A high level review panel, with representatives from the academic world as well as from the utilities under consideration has been appointed. a listing of the five-person panel is as follows:

Mr. Boiteux (Chairman)	Director General Electricite de France
Prof. A. R. Prest	Chairman, Economics Dept. 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

D. Research Projects to be Considered

The major projects to be considered by the panel are as follows:

- Analysis of Problems and Issues in Village Electrification
- Pricing and Investment in Electricity Supply

- Village Water Supply
- Standards of Reliability of Urban Electricity Supply
- Pricing and Investment in Telecommunications
- Rural Water Supply
- Wastewater Reuse
- Appropriate Technology for Water Supply and Waste Disposal
- Oil and Gas Potential of Oil-Importing Developing Countries
- Design of Low Cost Water Distribution Systems

In addition, a number of smaller projects should also be considered. These include research on a variety of subjects, ranging from the development of a hand pump for rural areas of developing countries to an analysis of telecommunications usage in Papua New Guinea. Since the dividing line between the research work conducted in this sector and operational work, particularly in the economics area, is so blurred, the terms of reference of the panel should be defined to include consideration of the general development of economic analysis in the sector, and the way in which this has been reflected in operational work.

E. Schedule of Work

The panel will begin its work in October 1978. A tentative work program is as follows:

- | | |
|---------------|---|
| October 1978 | Panel spends 3 days in Washington, gathering documentation and talking to staff: division of labor among panel arranged. |
| February 1979 | Panel meets in Washington for one week, to discuss findings on individual projects: an approach to preparation of draft final report to be agreed. Future talks as necessary with Bank staff. |
| March 1979 | Submission of final report. |

OFFICE MEMORANDUM

TO: Members of the Industrial Development and
Trade Panel

FROM: Assar Lindbeck *Assar Lindbeck*

SUBJECT: Schedule for the Next Meeting

DATE: July 21, 1978

1. The time schedule that we agreed about is:

October 26: First draft sent to all members
(including Bery)

November 15: "Second man" sends revision of draft (made
by "first man") to all members

Obs.: Only section 3 of the first draft (dealing
with specific projects) and recommendations
in connection with this has to be revised

November 30, December 1 and possibly half of December 2:
Meeting in Washington, D.C.

2. Members of the panel are recommended to arrange, in cooperation
with Bery, private meetings with people at the Bank - either in connection
with meetings in Washington or at any other time, or both.

Suggested organization of the papers
for the next meeting by each participant

- (1) General comments on the research problems of the Bank.
- (2) Comments on research on trade and industry within the Bank.
- (3) Comments on the specific projects studied by each of the panel members -- organized in some systematic way.
- (4) Implications of points (1) - (3) for future research and research organization of the Bank

Division of labor among panel
members in the scrutinization of specific projects

A.L.	0	General points	(20 pp)
JD/KJI	I	Incentive policies (incl. integration)	(10 pp)
EB/JD	II	Patterns of growth and trade and comparative advantage	(10 pp)
KJI/GB	III	Export promotion and access to markets	(10 pp)
GB/RN	IV	Institutional reforms -- credit markets, small scale industry, and public enterprise	(10 pp)
KP/EB	V	Industrial programming for process industries	(10 pp)
RN/KP	VI	Industrial programming for non-process industries -- capacity utilization, capital-labor substitution, technological change	(10 pp)

CHECKLIST FOR WRITERS

- (1) What has been learnt from the research in the Bank? Direct as well as indirect effects on the stock of knowledge (via influence on scholars outside the Bank as well).
- (2) Is there in the material that we have studied an indication that the knowledge outside the Bank has been transmitted to the Bank, and adopted for dissemination by various members of the Bank. Duplications?
- (3) The relevance of the research in the Bank
 - a) for Bank operations/(i) lending, (ii) policy advising/
 - b) for developing and disseminating knowledge and paradigms about the development process.
 - c) for the need of the LDCs in their national policies
- (4) Has the Bank been engaged in "basic research"?
- (5) Willingness and ability of "operating people" of Bank to absorb and use research ("assimilation problem")
- (6) Involvement of LDCs in Bank research
 - a) in initiating research of Bank
 - b) in participating in Bank research
 - c) in organizing research in the LDCs and/or in the training of researchers in the LDCs
- (7) The use of "outsiders" (non-Bank people) in Bank research; the use of consultants
- (8) The composition of research
 - a) development of theory and methods vs. empirical research
 - b) the degree of policy orientation of research
 - c) choice (mix) of topics (problems)
 - d) "academic" research vs "information gathering", assessments and forecasting

- (9) Criteria used by the Bank when choosing projects. Constraints on research in Bank.
- (10) Recommendations on the basis of analysis above, for instance about
- a) size of research by Bank
 - b) composition of research on fields, problems and methods
 - c) procedures of hiring researchers
 - d) dissemination and assimilation of research
 - e) how to use "outside" knowledge and resources better
 - f) how to make research more "relevant" - for what?
 - (i) for instance, should the Bank be a "knowledge Bank" and not only a financial Bank?
 - (ii) to what extent should the research of the Bank be subordinate to operation activities within the Bank
 - (iii) should the Bank engage itself in "basic research" - to what extent?
 - g) how much and how should LDCs be involved in Bank research? How?
 - h) how much and how shall outsiders be used?

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 Appendix), 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 byproduct of efforts to reach answers on an important topic?

2. Draft Report Outline: This will be in four sections and will cover the following aspects :

A. Introduction

B. Research Areas

- (i) Highway Design and Maintenance Standards
- (ii) Rural Roads
- (iii) Substitution of Labor and Equipment in Civil Construction
- (iv) Ports
- (v) Railways

C. General Evaluation

- (i) Impact within the Bank
- (ii) Impact in member countries

D. Future Research

- (i) Transport
- (ii) Specific Recommendations

3. Responsibilities and Timetables for the First and Second Drafts of the Report:

Sections A and C	:	J. Cauas
Section B (i)	:	D. Bjoernland
Section B (ii)	:	D. L'Huillier
Section B (iii)	:	R. Felix
Section B (iv)	:	K.L. Goon
Section B (v)	:	S. Jagannathan
Section D	:	Pending - for next meeting

The first drafts will be sent to the Transportation Department by mid-September 1978, for distribution to the members of the Commission only. A second draft of the report (including section D) will be available for limited distribution by the end of November 1978.

4. Draft Agenda and Timetable of the Next Meeting:

The second meeting is scheduled for the week of October 23 or October 30, 1978 (the exact date to be confirmed by Mr. Willoughby). The proposed agenda is as follows:

Monday	-	morning	:	Commission meeting - private
		afternoon	:	Meeting with Regions - Highways
Tuesday	-	morning	:	Meeting with Regions - Railways
		afternoon	:	Commission - private meetings with regional staff
Wednesday	-	morning	:	Meeting with Regions - Ports
		afternoon	:	Commission - private
Thursday	-	morning	:	Meeting with Projects Directors
		afternoon	:	Commission - private meetings with regional staff
Friday	-	morning	:)	Commission - private
		afternoon	:)	

A luncheon will be arranged with the Director of the Policy Planning and Review Department for discussion of general Bank policy issues.

CRWilloughby/BMitchell:ww

cc: Messrs. W. Baum, Vice President Central Projects
 H. Chenery, Vice President Development Policy
 B. Balassa, Research Adviser (Acting)
 C. Willoughby, Director, TRP
 C. Harral, Adviser, TRP