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TRANSPORT RESEARCH PROGRAM

Progress Report

December 12, 1963 - June 12, 1964

The Brookings Institution
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June 12, 1964

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Review of Progress

At the end of the first two years, the Brookings Transport Research Program has ten major projects underway in Washington and four subcontracts outside Washington. In the past six months, principal emphasis has been focused on two broad areas of inquiry. One is the analysis of case studies of completed transport facilities, aimed at shedding light on the development role of transport. The other is the study of approaches to estimating transport requirements for development, which is being examined from the viewpoint of individual projects, national systems, and multi-national regions.

The case study program has drawn on project experience in seven Latin American countries and six countries in Asia. A summary of the cases and a synthesis of the findings will be published during the coming year.

Work on the problem of estimating transport requirements includes a critique of current approaches, improvements in the technique of determining economic feasibility, and a manual to assist AID staff and contractors. The geographically broader approach to national and regional requirements includes the development of new methodology using Syria as an example, analysis of regional requirements with special reference to Madras State in India, and study of economic integration potentials through the development of transport in South America.

During recent months there have been increasing contacts between Brookings staff and transport research programs elsewhere, including the Economic Commissions of the United Nations, the National Council of Applied Economic Research in India, the Asian Institute for Economic Development, and the Harvard Advisory Service. A series of conferences is also in the planning stage, including the subjects of financing transport and pre-investment surveys.

Review copies of the book Strategy for Mobility will be available this month. A second book, Transport and Economic Development: Introductory Theory, will be published in the fall.

Research at the Brookings Institution

1. Transport Investment Criteria
Tillo E. Kuhn

The three parts of this study include (a) a review of more than fifty pre-investment surveys of proposed transport projects; (b) an analysis of approaches to improve existing survey techniques; and (c) the preparation of a manual to help guide AID staff and consulting firms in the preparation of future feasibility studies.

Among the principal concerns of this study are the inadequacies of cost estimation for transport projects, the absence of adequate means for projecting transport demand, the lack of an appropriate conceptual framework to permit the determination of economic feasibility, and the excessive costs and time involved in pre-investment survey preparation.

Included in the report is an analysis of the time consumed in investment surveys, and the time lags from survey results to loan agreements, money disbursement, and project completion. A second inquiry concerns the time dimension, the problem of interest or discount rates, and practical suggestions for cost and benefit valuation. A third major area of study relates to transport demand and the relation of traffic to resource endowment, to the agricultural sector, and to industry, public services, and other economic and social goals and activities.

2. Case Studies of Transport Investments
George W. Wilson

This project includes a series of case studies of the effects of transport investments on economic development in various countries of Latin America and South Asia. A detailed description of the project will be found in previous progress reports. Field work has now been completed and the general analysis is at an advanced stage. A tentative outline for the manuscript, expected to be in final draft form in August 1964, includes:

Part I - Introduction
Part II - The Cases
Part III - Methodology of the Cases
Part IV - Analysis of the Cases
Part V - Implications for the Theory of Economic Development
Part VI - Lessons for Policy

3. Transport and the Economic Integration of South America
Robert T. Brown

This is a new project started in January 1964 and expected to run through the spring of 1965. The study attempts to make a contribution to the solution of transport problems confronting the South American countries as they move toward economic integration.

Recently all the republics of South America except Bolivia and Venezuela banded together to form the Latin American Free Trade Association, of which Mexico is also a member. These nations hope that by means of reducing tariff barriers among themselves a regional market can be established which is large enough to justify the creation of new industries which can operate on a large scale and supply the entire area. The concept of import substitution would thus be applied on a multi-national basis as a natural extension of its present application on a national basis.

The basis on which the Free Trade Association is being established, however, is far weaker than that which confronted Europe when the Common Market was formed. Unlike Europe, Latin America has never had any significant intraregional commerce. Industries presently operating are strongly protected and unaccustomed to competition. The monetary policies of the different countries vary widely and wild inflations are common in many of the countries. Present industry is located nearly exclusively on the periphery of the continent in a few isolated centers. Overland transport routes exist in only a few instances and even here are seldom used. Mail, telephone, and teletype communications are deplorable.

At the present time, however, there is practically no basis on which to make decisions on transport policy and investments. A real danger exists that decisions will be made on a political basis and that the future of the Free Trade Association could be adversely affected.

The purpose of this study is to contribute to the preparation of a basis on which rational decisions regarding transport policies and investments can be made. There are two basic parts to the study. The first is an analysis of maritime transport, which at present accounts for well over 90 percent of the trade of the region. The focus of this part will be on the effect of a dependence on maritime transport on the location of industries within the area and on the probable effect of policies which reserve maritime shipping for Latin American ships. The second part, which begins with a geographical analysis of economic integration, will focus on the desirability of better international land transport in the southern part of the continent.

An historical perspective is added by studying the attempts at building a Pan American Railroad and the Pan American Highway System.

A recent trip to South America was undertaken to overcome the serious lack of data in Washington regarding present maritime trade flows and freight rates among the different Latin American countries. The trade flows can now be used in an application of a model which was developed to determine rational trade routes around the South American continent. In addition, discussions were held on proposals to establish shipping reserves with representatives of several governments as well as with experts at the Economic Commission for Latin America and at the Free Trade Association headquarters in Montevideo. It is hoped that university staff in Rosario, Argentina, and Sao Paulo, Brazil, will be able to collect additional information on international land transport between those two key countries.

4. Transport Costs and Plant Location in South America
David Kendrick

This, a second new project, was begun in February 1964, and will run through June 1965. It is an attempt to develop techniques, on the basis of one industry, for the determination of efficient plant location within a South American common market. Among the various factors involved, transport costs and economies of scale will be given special attention. Since, other things being equal, high transport costs tend to decentralize an industry and economies of scale tend to centralize it, the interplay of these two forces largely determines an efficient locational pattern. Investment in transport can, of course, change the relative strength of the two forces and is thus of special importance.

Mr. Kendrick will spend six months in South America, beginning in the summer, collecting field data for use in his analysis.

5. Pricing Policy and Transport Finance
Alan A. Walters and Sam Weiner

The aim of this study is to recommend policies for the financing of transport facilities that are consistent with the goals of economic development, and to describe the present methods being used to finance transport in several underdeveloped countries. The study will be used as a background paper for a conference on pricing and finance, which will be held later this

year. A synopsis of the main points of the paper follows:

Questions of finance are essentially questions of price policy. This report emphasizes the correct pricing policy that ought to be followed from an economics standpoint; that the price charged for the use of highways or railroad facilities should equal short-run marginal social cost. Prices should reflect the resources used up in providing the good or service. A policy of marginal cost pricing clearly accomplishes that goal. An underdeveloped country must try to husband its scarce resources in the hope of achieving a rate of economic growth at least equal to population growth, and preferably high enough to set in motion the chain of cumulative results that lead to economic development. It is critically important to this end that correct pricing policies be followed in the financing of transportation facilities.

Price serves the dual role of allocating available supplies and making available financial resources to those who provide facilities. The amount of finance provided by a theoretically correct pricing policy may not be equal to the cost incurred. Where such a discrepancy arises, alternative sources of finance for the transport sector must be found. Where non-user taxation is employed for that purpose, this must also be soundly based on economic grounds. Several arrangements for obtaining transport funds from non-users are discussed.

This study contains detailed description of the financing of transport facilities in India, Nigeria, and Argentina.

6. Structure and Requirements of Syrian Transport
Nuhad J. Kanaan

The objective of this study is twofold: The first is to examine the structure and connectivity of the transport network in Syria and its relationship to the transport demands of the country. The second objective is to examine the utility of mathematical tools in a detailed analysis of the transport network of a developing country.

Since the project is in final draft form, a synopsis of the findings are presented below.

The relationships between transportation and a number of factors that are related to it, such as population distribution, agricultural production, industrial production, surface configuration, etc. were examined,

and it was found that the closest relationship was between transport facilities and agricultural production, reflecting the role of agriculture in Syria, which is by far the most important economic activity in the country. There is a lesser relationship between transportation and population distribution, as well as industrial production, reflecting the low mobility of population in Syria, and the fact that industrial growth is in its early stages.

The analysis shows how the development of transport facilities in certain important regions of the country has lagged behind demand. This was especially the case in the newly developed agricultural areas of the northeast, where a large increase in agricultural production, and especially in the two important export items of cotton and wheat, has taken place in recent years. The completion of a number of irrigation projects in this area within the next few years will increase this production even further. Since the agricultural products of Syria mature at an earlier time than most of those of its competitors, they command a high price in world markets, and it is of special importance to be able to move these products to the port of export as fast as possible. The railway that is under construction in this area will help to move these commodities, but the road network in the area will have to be improved in order to supplement the railway.

Another important lag in the development of transportation in Syria stems from attempts to re-align the country's network in order to focus the imports and exports of the country on the main port city of Latiquiya. This re-alignment was made necessary when the partitioning of the whole area after World War I took place, and the important ports of Alexandretta, Beirut, Haifa, and Tripoli were included in other states. Even though Latiquiya has been handling a large amount of imports and exports, it is not yet well connected to its hinterland, especially the parts of the country that lie to the south. This situation will improve once the above mentioned railway is completed, but the southern part of the country will continue to be poorly connected to this port. This situation could be partially improved by constructing a rail link joining Damascus to Homs, which will not only make the south accessible to Latiquiya, but will make possible the movement by railway from one part of the country to another, something which is not possible at present.

The techniques used in this study (graph theory and regression analysis) enable the investigator to measure the development of the transport network of any country on a regional basis, and relate the network structure to the region's transport demand. In this fashion, areas where

there is a lag in the development of transport facilities can be identified, as well as those that have more transport facilities than the region requires. The areas where the lag exists are then isolated and examined closely in order to determine what improvements may be undertaken to improve circulation.

A second use for these techniques is to permit an examination of the changes in the accessibility of urban places through time. This enables the identification of important urban centers that have become poorly connected to the rest of the country, as well as new urban centers which are well connected and may, therefore, be expected to grow.

7. Transport and Soviet Economic Development
Holland Hunter and Alan J. Abouchar

The objective of the study is to bring to light any serious errors made by the Soviet planners in the location of industry and in the provision of transport services. Besides analysis of the reasons for such errors, experience will be gained in optimization techniques for the location of the cement industry, an industry important to economic development generally. These techniques may lend themselves to generalization and to application elsewhere.

Work during the last several months on this project, described in detail in previous progress reports, has been focused on analysis of the Soviet cement industry. The cement industry has been chosen as an important transport-intensive industry with a product having relatively consistent uses, i.e. construction. As a result it is presumably more amenable to analysis than, say, the steel industry.

Thus far the study has concentrated on the early Soviet period. In the 1920's the use of transport by the industry was about 150 percent greater than before the revolution, although the regional consumption pattern does not seem to have changed very much if at all. Moreover, there were no apparent compensating savings from concentration of production to offset this greater transport use.

In the next 30 years production increased about 20-fold, to about 33 million tons a year (by comparison, steel production in 1958 was about 50 million tons). There are indications that the industry has been using more transportation than has been necessary even in recent years, but the reasons for this have not yet been fully analyzed.

Research at Other Institutions

1. Evaluation of Administrative Recommendations for Transport Financing Agencies
John Lindeman, Syracuse University

The principal purpose of this project is to analyze the expert recommendations made by study groups (or individual experts) in connection with the administration of transportation in underdeveloped countries. The project was outlined in some detail in past progress reports.

Data have now been gathered and analyzed on twenty-one countries, based on published studies and on such unpublished work as has been available. The results tend to corroborate the initial hypotheses (as contained in the project prospectus), but it is too early to come to definite conclusions.

It has been possible to augment the project staff, at very low cost, because of a related project which the Maxwell School is also undertaking. This project has to do with the administration of technical assistance in all of its forms. The project is primarily concerned with the administration of technical assistance in the field of agriculture, but the terms of reference are such that the investigation will deal with administration in general.

During the coming summer, the staff will be concerned with consolidating the material already accumulated, in working up new material, and in interviewing people who have served as transportation advisors on field missions.

Considerable manuscript material has been prepared, and will be put into coherent and unified form during the next few months. Four special case studies are also in process.

2. Harvard Transport Research Program
John R. Meyer, Harvard University
Martin Wohl, Brookings
Brian V. Martin, Brookings

The formal seminar program on Transportation and Economic Development for the academic year 1963-64 has been completed, and some

of the research papers which stem from this program will be forthcoming in the next few months. This seminar has been used first as a basis for training undergraduate and graduate students in transport economics and planning, or of improving their analytical capabilities. Second, the seminar has helped to initiate substantial research efforts on problems of interest to underdeveloped countries.

Among the investigations which will be completed at the end of the academic year are papers or theses on:

The Economics of Urban Form in Underdeveloped Countries
Transportation Pricing in Underdeveloped Countries--A Welfare Analysis
Road and Rail in India
Transportation in Colombia--Case Study in the Economics and Politics of Resource Allocation
Demand for Urban, Intra-City Passenger Transportation in Underdeveloped Countries
The Capital Intensiveness of Transportation Systems and Economic Development in Underdeveloped Countries
A Market Forecast for V/STOL Aircraft to be Used in Commercial Service in Underdeveloped Countries
An Investigation and Comparison of Two Schemes for Evaluation of Transportation Construction Projects in Underdeveloped Areas

This part of the Harvard Transport Research Program was directed jointly by John Meyer and Martin Wohl, supplemented by the assistance of Brian Martin, Charles Warden, Benjamin Cohen, and three outside guest lecturers.

The training aspects of the seminar program conducted in the 1963-64 academic year will be continued during the coming year as a separate course in Transportation Economics and Planning and will be taught jointly by Meyer, Wohl, and Martin. At the same time, the seminar on Transportation and Economic Development will also be continued, with attendance limited to those with more advanced transportation backgrounds and with emphasis on full development of the research underway in connection with the Brookings study. During the course of the 1964 summer and fall training program on Transportation Economics and Planning, the preliminary notes prepared during the past year on "Applied Transportation Decision-Making" will be more fully developed for ultimate use in a manuscript on the subject.

In March 1964, Brian Martin, formerly a Research Engineer at MIT, joined the full-time staff of the Harvard Transport Research Program, and work began on the investigation of transport technology for underdeveloped countries, that is, on questions of the relationship between technological capabilities, their cost and performance characteristics, and the manner in which they interact with investment and production possibilities. This part of the overall program has received attention in depth from all members of our staff, though principal responsibility for its ultimate completion rests with Brian Martin. Development of the conceptual framework and basic models for analyzing and evaluating the consequences of alternative transportation investment levels and technologies, and for noting the impact of differing growth and production capabilities has proceeded satisfactorily. The work should be sufficiently advanced for initial programing by late June. Establishment of appropriate demand and production functions, and of basic technological input, will to a large extent be conducted during the course of the summer and fall months.

3. Case Study of African City-Hinterland Development
Leon N. Moses, Northwestern University

This project seeks to relate rural migration to cities and their attendant costs, particularly the necessary provision of city services, to transport investment.

In order to study the problem, a case study of Accra, Ghana was undertaken. The hinterland of Accra apparently includes all of Ghana. The study has thus far been organized in a series of sub-projects. The first of these concerns the patterns and determinants of migration, based in large part on the 1960 Ghanaian census. It seems clear that urban migration can be explained in terms of income and opportunity differentials. Yet further analysis indicates that there is a considerable core of this migration which will not be seriously slowed by transport or other investment in the hinterland. This group consists of the educated who migrate in great numbers. Education is a major factor in explaining urban migration. We cannot expect transport investment to open up opportunities in the hinterland attractive enough to divert the educated. On the other hand, the unskilled may be more easily induced to remain in the hinterland.

Two related studies indicate that transportation investment has played an important role in hinterland development and thus has indirectly affected the present pattern of urban migration. One of these studies is directed toward an assessment of lead-lag relations between agricultural and industrial development and extensions of the transport system. This

analysis is based on the historical development of Ghana and on more recent records of commodity flows by road and rail. A draft research report on this study will be completed in June. Two important regions for transport development in the future are the Western Region and the Northern Territories. The Western Region has apparently been systematically and deliberately deprived of roads for many years. However, due to disease in the Eastern cocoa region the cocoa farmers have moved west and new pressure is being exerted on the transport network in the west.

The Northern Territories have no railroads and very few roads. It is much less developed than most of the rest of Ghana, partly due to regular water shortage during the long dry season. However, we have been led to believe that study of this region may be quite rewarding in terms of migration, agricultural development and the role of transport in growth.

Statistics and papers on the transportation system and economic development in Nigeria have been gathered and summarized from sources in the African collection of Northwestern. It is anticipated that the analysis of Ghana will be supplemented with comparable but fragmentary data from Nigeria and other African countries. Analysis of these data will be organized so as to complement the Ghanaian study.

MEETINGS

Bangkok

Asian Institute for Economic Development

Seminar on the role of transportation in the development process (Owen, April 1964)

Seminar on pre-investment survey techniques (Kuhn, May 1964)

Liaison with Brookings transport program (Wilson, March 1964)

SEATO

Discussed impending series of transport studies of the Graduate School of Mechanical Engineering (Wilson, March 1964)

ECAFE

Discussion with staff of the Transport & Communications Division on the Brookings transport program and its implications for ECAFE (Wilson, March 1964; Owen, April 1964)

New Delhi

National Council for Applied Economic Research

Discussion of general approach and status of Madras study (Owen, April 1964)

Participation in analysis of Madras study data (Harral, May and June, 1964)

General plans and specific studies (Wilson, March 1964)

Planning Commission

Discussion of commodity transportation studies being undertaken by the Commission as a basis for Fourth Plan estimates of transport requirements (Owen, April 1964)

Discussion of transport and other development problems (Wilson, March 1964)

Ministry of Transport

Discussion of India's transport problems with head of transport research department (Wilson, March 1964)

Kuala Lumpur

Malaysia International Transport Adviser and staff

Discussion of Malaysian transport problems (Wilson, March 1964)

Ford Foundation

Malaysian economy discussions (Wilson, March 1964)

Rawalpindi (Pakistan)

Ministry of Transport Director

Discussion of case studies in Pakistan (Wilson, March 1964)

Karachi

Harvard-Ford Foundation

Discussions on Pakistan transport problems (Wilson, March 1964)

Cairo

Ministry of Transport

Discussion of Egyptian transport problems (Wilson, March 1964)

Tokyo

International Road Federation, Second Pacific Regional Conference

Paper presented on the subject of the Transport Revolution in Asia (Owen, April 1964)

Athens

Doxiadis Associates

Discussion of approach to survey of transportation requirements of Libya (Owen, May 1964)

Paris

Development Advisory Center

Conference with Deputy Minister Coffin regarding preliminary findings of the Brookings program as they relate to accelerating project preparation in the transport field (Owen, May 1964)

Santiago

Undersecretariat of Transport

Discussion on ocean shipping reserves and ocean freight rates (Brown, May 1964)

ECLA

Discussion of transportation in Latin America (Brown, May 1964)

Economic Research Institute

Discussion of port efficiency and land transport costs between Chile and Argentina (Brown, May 1964)

Bureau of the Budget

Discussion of the design of a transport program under the Chile-University of California project (Brown, May 1964)

Montevideo

LAFTA (Latin American Free Trade Association)

Discussion of transport problems in economic integration in Latin America (Brown, May 1964)

Buenos Aires

National Development Council

Discussions of international transport between Uruguay and Brazil (Brown, May 1964)

Department of Merchant Marine and Ports

Discussions of ocean shipping reserves and freight rates (Brown, May 1964)

Latin American Railway Association

Discussions of international railway integration (Brown, May 1964)

Rosario (Argentina)

University Regional and Urban Planning Institute

Discussion of the methodology for an integrated regional plan (Brown, May 1964)

Sao Paulo (Brazil)

University Institute of Economic Research

Discussion of international transportation between Argentina and Uruguay (Brown, May 1964)

Washington

Agency for International Development

Series of meetings helping to plan economic feasibility studies on Burma Road project (Kuhn, Haefele, Harral, Wilson, Finne, February-April, 1964)

Briefing session for AID mission directors from Latin America (Owen, March 1964)

Discussion of aviation operations of AID (Finne, Kanaan, Harral, Kuhn, Brown, Weiner, Walters, Haefele, April 1964)

Briefing session for AID Administrator and staff (Owen, February 1964)

Briefing session for Human Resources and Social Development staff (Owen, March 1964)

In addition, a number of informal meetings were held with Agency personnel on particular transport problems in East Pakistan, the Sudan, and other countries.

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