

Transportation in Developing Countries: Some Sensitivity Considerations

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The paper discusses some sensitivity considerations, such as integration of land use and transport, development, and public transportation, used in evaluating transportation in developing countries. In assessing needs, evaluating transport developments, and comparing impacts, policy makers in the developing countries have had to work with only a limited background of statistical information and economic research. Thus, the paper is not a statistical information source, but rather stresses the need for improvement in collection and refinement of transportation data. Transport planning is still in its infancy in these countries and is developing through experience. A large gap exists between planning and execution. The paper presents a number of needs and recommendations for discussion, for example, the need in the developing nations to enhance the concept of comprehensive and balanced transportation planning and development.

The wheel and the rivers have been the backbone of communication of the early civilizations of the Middle and Far East and even Africa. These areas, known as the developing countries, face a new age of transition (1). The forthcoming transition (no more than one generation) will equal the total changes that have taken place in the long history of these nations. The challenges facing these nations are uniquely different from those facing the Western world. Transport routes in themselves and the centers they serve have not changed in many years. The sudden and explosive rise in national income in some of these nations allows them for the first time to stabilize their population explosion, eliminate illiteracy, expand health and social services, and place themselves on the road of long-term survival. Thus, they view transportation as an essential means to achieve these goals and not as an end in itself.

This paper presents some sensitivity issues in transportation for selected developing nations and relates these, wherever possible, to the U.S. scene. The question facing transport policy makers today is not whether to have strategies for moving people and goods but rather what kind of strategies are most appropriate to cope with problems common to the United States, the industrialized world, and the developing nations regardless of their "time lag" in change. Thus, the purpose of the paper is to reflect the needs and development potential of transportation facilities in these countries.

BACKGROUND

The data presented in this report are often approximate and give a broad indication of the scale of activities and trends rather than precise figures. In fact, as a first indication of need and an area of extreme importance, this paper stresses the need for improvements in collection and refinement of transportation data bases and further supports research into the fundamental characteristics of transport in developing countries (2).

Nine countries account for 80 percent of all passenger vehicles (automobiles and buses) in the world. The percentage each country has of passenger vehicles in its region in 1970 was as follows (3):

| <u>Country</u> | <u>Region</u> | <u>Percentage</u> |
|---|---------------|-------------------|
| United States | North America | 91 |
| Brazil | South America | 46 |
| South Africa | Africa | 48 |
| Japan | Asia | 72 |
| France, West Germany, and United Kingdom | Europe | 71 |
| Australia | Oceania | 80 |
| Not available | U.S.S.R. | — |

Development plans in the developing countries emphasize both development of and need for increased transportation facilities.

The Plan Organization in Iran, strengthened with newly acquired oil revenues and entrusted with the direction and implementation of the latest development plan, has taken measures to develop 6500 km of new roads and highways, 12 000 km of secondary and feeder roads, 730 km of railroads, a new Tehran international airport, 960,000 new dwelling units in urban and rural areas, 1.8 million new jobs, a program to make 7.4 million persons literate, an annual controlled water supply of 9.5 Gm³, a program to provide 1 telephone for every 33 citizens, and extensive social and health delivery systems.

Saudi Arabia's 5-year plan of May 1975 calls for a total \$140 billion investment by the government. The Central Planning Organization, with the assistance of Stanford Research Institute of the United States, has developed a plan that includes 4000 km of paved roads, 1040 km of city streets, a public transit system between Jedda and Mecca, 15 airports, 100,000 housing units for first 5-year plan, new urban and city expansion programs, 1.8 Tg increase in port capacity, 15 public hospitals, 8 sewage networks, extensive industrial development (steel mills, fertilizer plants), and extensive water supply network and seawater desalting.

Iraq plans huge investments to improve water supplies, an extensive land reclamation effort, and a unified roadway network (4, 5, 6, 7, 8).

SENSITIVITY CONSIDERATIONS

In assessing needs, evaluating transport developments, and comparing impacts, we should recognize the terms of reference and limitations that the policy makers in developing countries have set for themselves. Many of the plans have been developed with a relatively limited background of statistical information and economic research. They identify inadequacies and attempt to induce improvements in projections and ultimately accelerate implementation. Transport planning in these countries is still in its infancy and evolving through experience. There is a large gap between planning and execution. The following is a discussion of some sensitivity considerations in evaluating transportation in developing countries.

Transport Management and Positive Planning

In the execution of transportation planning and development, the administrative framework departs significantly from U.S. practice but not from European practice. Overall planning starts at the national level with the development of national criteria for transport development. In many instances, it is even multinational. The role of local and

even regional jurisdictions is normally operations oriented, that is, carrying out the plan. For any area or region, transport policies and plans are drawn up as a schedule of planned objectives for the area's role in supranational, national, and regional contexts. This is especially true in Iraq, Iran, Kuwait, Lebanon, and several African nations. Transport planning and development are closely tied to the overall general plan. Personal mobility and goods movement routes are an integral element of the plan of development. Transportation is one of several uses of land. This approach in administering transportation development is similar to that in many European countries, especially Western Germany and the United Kingdom (8).

In the United States, efforts toward setting up regional administrative frameworks for transportation planning and development are succeeding under the umbrellas of councils of governments and occasionally metropolitan planning organizations. In the field of aviation, the developing countries, especially the Arab nations, are showing the rest of the airline world how things should be done. They have persuaded their members to agree on an open-sky policy for airline service among them, to hold the line on fares, and to observe the ethics of reasonable capacity.

Integration of Land Use and Transportation Development

Transportation and land use development follow and are truly an indispensable element of a public investment plan—the general plan—in the developing countries. Invariably, integrating transportation and land use is discussed not as mandatory and desirable but rather as a matter of fact. Both are one and the same—elements of a universal development model. Thus, transportation at this stage in the developing countries is perceived as a developmental tool. Transportation and other public services provide support for enhancing economic opportunities (i.e., opening land uses). The completion of the Iran-Turkey and Eastern Europe railroad network and the development of the Trans-Arab road network are intended in totality as an instrument of economic development (Figure 1).

Public Transportation

There seems to be an acute shortage of organized public transport both for passengers and for goods. Present regulations, restrictions, physical limitations, and other barriers make this means of transport inefficient (thus expensive), unorganized, and in many instances unreliable. However, it seems necessary in the developing countries, especially in the large urban areas (basically monocentric cities such as Tehran and Baghdad) to formulate the land use and transport models in which the conditions for maximum capacity exploitation of public transportation are met. With extremely low vehicle ownership (due to several reasons including low income per capita), an opportunity to effectuate an integrated public transportation corridor and land use policy, reduce the staggering accident rates (Table 1, 9), and eliminate the undetected and often unrealized environmental problems can be a reality in a short period.

The developing countries come nearest of any culture in believing and accepting that transportation is a public service and hence should be "free." Subsidies—capital and operational—have long been in effect in many of these countries. The public transport system is augmented by some unique private services. In Iraq and Iran, and especially in Baghdad and Tehran, share-a-taxi, double decker suburban bus service, jitney services, and a publico system (similar to that in some of the cities in Puerto Rico) have been operating since the early fifties. Of course, pedestrianism is a way of life rather than a lost art.

The investment of many governments of the developing countries in public transportation is conceived as being beyond realizing only user benefits. In my opinion, free transportation is accepted, if necessary, by the authorities as a public service (moral) obligation with attendant economic, land use, and environmental benefits.

Figure 1. Inter-Arab States regional network of roads.

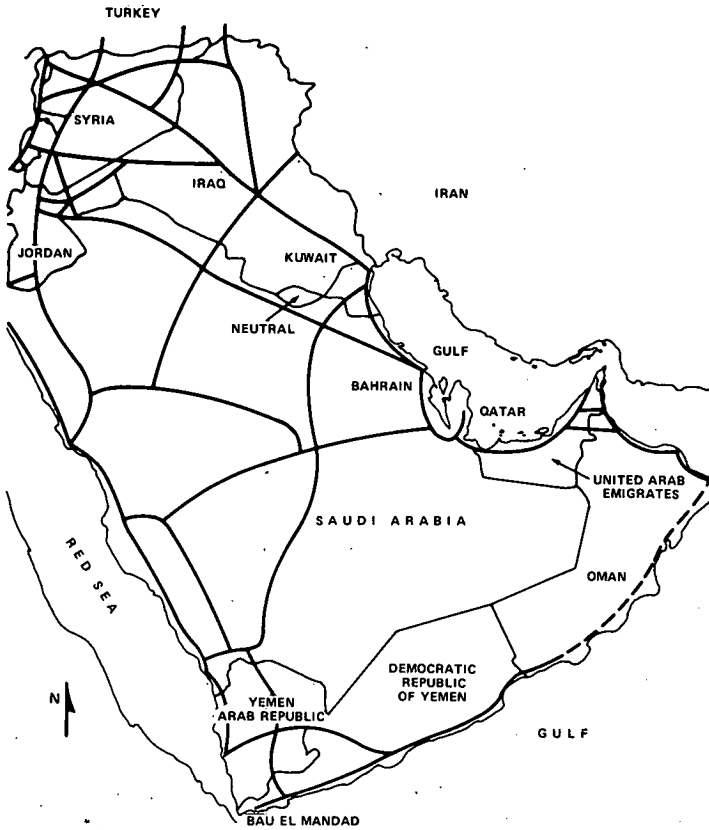


Table 1. 1968 population, vehicle ownership, and accident rates of selected countries.

| Country | Population | Vehicles | Vehicles per Person | Fatalities per 10,000 Vehicles | Injuries per 10,000 Vehicles | Severity Index |
|---------------|-------------|-------------|---------------------|--------------------------------|------------------------------|----------------|
| Australia | 12,173,000 | 4,463,000 | 0.367 | 7.58 | 184.20 | 0.040 |
| Chile | 9,351,000 | 283,240 | 0.031 | 51.00 | 849.00 | 5.68 |
| Great Britain | 55,283,000 | 14,446,000 | 0.261 | 4.71 | 237.02 | 0.020 |
| Jamaica | 1,791,000 | 65,000 | 0.036 | 42.73 | 792.50 | 0.051 |
| Japan | 100,510,000 | 12,870,000 | 0.128 | 12.46 | 643.41 | 0.51 |
| India | 501,760,000 | 1,153,586 | 0.002 | 84.00 | 445.00 | 15.93 |
| Indonesia | 114,640,000 | 623,174 | 0.006 | 37.00 | 177.00 | 17.45 |
| Iraq | 8,766,000 | 138,406 | 0.016 | 60.00 | 114.00 | 34.36 |
| Kenya | 10,209,000 | 101,972 | 0.010 | 65.70 | 483.30 | 11.97 |
| Kuwait | 700,000 | 134,188 | 0.192 | 15.00 | 195.00 | 7.28 |
| Pakistan | 113,000,000 | 203,165 | 0.002 | 81.00 | 252.00 | 24.34 |
| Portugal | 8,994,000 | 738,229 | | 16.00 | 319.00 | 4.79 |
| New Zealand | 2,776,000 | 1,100,000 | 0.396 | 4.75 | 160.89 | 0.029 |
| South Africa | 19,167,000 | 1,929,000 | 0.101 | 30.00 | 283.00 | 9.63 |
| Syria | 5,460,000 | 50,747 | 0.010 | 66.00 | 328.00 | 16.83 |
| United States | 201,152,000 | 108,000,000 | 0.537 | 5.11 | 185.19 | 0.027 |
| Uganda | 8,000,000 | 51,000 | 0.006 | 100.80 | 889.41 | 0.100 |
| Yugoslavia | 20,154,000 | 893,555 | 0.043 | 30.00 | 433.00 | 6.52 |

Public Acceptance and Involvement in Transport Policy and Development Formulation

At this stage in the development of transportation facilities in the developing countries, open planning is perceived as being time and cost intensive and at best as having an uncertain outcome. The task of stimulating a sizable proportion of the public out of its apathy has proved deceptively difficult in public involvement processes in the United States and Europe. In the developing countries, the citizen participation process is not foreseen for some time. Even at the official level, the process is vertical and involves little communication.

Quantification of Transportation Impacts

At this stage in the progress of development in developing countries, improvement in the transportation system will not necessarily contribute to a decline in the quality of life. Any transport improvement is worth the cost. A larger population (due to the current and projected birth rates) coupled with improvement in the transport system may mean greater possibilities for division of labor and economics of scale. These possibilities in turn contribute to the growth of income per capita, to better education, and ultimately to better levels of living. But beyond a certain point, quantity and quality become competitive. These countries have yet to reach this point.

One of the main deficiencies of road planning in developing countries is that, in the establishment of investment priorities, quantitative consideration is given only to a relatively small proportion of the whole system. Estimation of the need for improvements to the major portion of the transportation system cannot be considered because of the cost. If this situation is to be changed, then simple methods of identifying areas of transport deficiency are recommended. It is evident (in my opinion) that maximum benefits in all 4 categories are accrued with almost any transport improvement in these countries at this stage of development.

For example, in studies undertaken in Europe and the United States, the value of a vehicle driver's time is perceived to be double the average hourly income for work trips and slightly above the average hourly income for nonwork trips. In the developing countries, the perception of the value of road use time and cost, in most cases, is nonexistent. A value has to be subjectively selected for use in the classical economic benefit-cost analyses (10).

Quantification of user impacts in these countries is a significant sensitivity issue. Review of accident rates (Table 1) in developing countries may at first seem relatively insignificant compared with the more immediate problems of malnutrition, lack of education, and the scarcity of financial and economic resources. Although it is true that the loss and suffering resulting from road accidents are small compared with that caused by poverty and sickness, the problem is more serious than the present figures alone indicate, for a number of reasons (9).

1. The loss to a developing country in economic terms from road fatality may be greater than at first appears since the population involved is not a representative cross section. Many of the fatalities occur to vehicle users, who generally come from the small minority of educated people—statesmen, doctors, teachers, and businessmen whose loss to the country is serious.
2. In developing countries, vehicle ownership, although at present low, is increasing rapidly and will be accompanied by a rapid increase in the total number of accidents, although not necessarily in the same proportion.
3. Countries should give thought to improving the road accident situation while they are in a relatively early stage of development since it is easier to incorporate safety features into roads during construction than afterwards. Furthermore, changes in attitudes and policy on road safety made at an early stage in development are likely to have a profound and continuing influence on the rate at which road accidents increase as road traffic increases.

Case studies of methods of quantifying socioeconomic and environmental impacts in the developing countries are limited. The nature of transportation developments (e.g., roads) has been primarily in open areas, and hence they are mostly considered as developmental highways. The difficulty in determining and quantifying impacts will be a serious issue since transportation is a service without which investment in other sectors of the economy of these countries would be useless. A significant case study of interest for comparative reasons will be the methodology used in impact determination and quantification for the proposed subway system in Tehran, one of the first in any urban area of a developing country.

NEEDS AND CONCLUDING REMARKS

It is evident that the developing countries will be significantly different in terms of their mobility needs in the last quarter of the twentieth century. Analysis of past trends has revealed several gaps and requirements in the transportation data base, travel behavior, and people and goods movement. As different regions in the world have differing needs and rates of growth of transportation by various modes, so does each developing country differ in its needs and requirements. Some of these nations, because of their sudden and expanded national gross income, will be able to plan and implement their overall plan (including transport) much faster than others. These include Iran, Iraq, Saudi Arabia and most of the Middle East, Nigeria, South Africa, Algeria, Libya, and Venezuela. The following conclusions, needs, and recommendations are presented for discussion.

1. World energy supply problems will affect the developed and the developing countries.
2. Price and control of fuel will reduce amounts of transportation or rates of economic growth in almost all the world. Oil-producing countries, including Iran, Iraq, Saudi Arabia, Kuwait, Nigeria, Venezuela, and North Africa, will, however, in my opinion, have the most explosive decade (1975-1985) in their history.
3. Estimates of vehicle ownership, travel needs, and transportation network parameters will have to be restudied and evaluated in a new light. Transport development will parallel growth in the country's economy and will have to compete with the need for housing, medical facilities, education, and industrial development.
4. The concern for the environment will tend to be global. In fact, Iran, Iraq, Saudi Arabia, and other developing countries have taken some steps to control and enhance the quality of the environment in some of their regions through advancement of regional parks concepts, water pollution control, and other programs.
5. In the field of transportation, the largest need in the developing nations is to enhance the concept of comprehensive and balanced transportation planning and development. Technical expertise has to be accelerated, and impact issues should crystallize soon. To this effect, assistance from the outside has been continual. In fact, the Federal Highway Administration of the U.S. Department of Transportation is currently under an agreement of cooperation with the Iran Ministry of Roads and Transport to provide technical assistance in the fields of highway planning, design, construction, research, and maintenance.
6. Two of the most pressing needs in the developing countries are (a) the implementation of their "developmental" highways to realize full economic potential and (b) the reduction of congestion in their urban centers, such as Tehran and Lagos. For example, to effectuate the second requirement, a public transportation system is advocated. Tehran is currently planning its subway system, and Baghdad is committed to expanded bus transportation.
7. Growth of international trade will be reflected in high growth rates for goods movement by road, air, and sea. In the developing countries and regions, this challenge is to be approached on a multinational (regional) basis. Trans-Arab road network, Iran-Turkey and Eastern Europe railroad network, inter-African roadways, and Pan American highways are only the beginning of a continuous, integrated, global trans-

port network.

8. The current birth rate in some of the developing countries will necessitate the advancement of the concept of new towns or new towns-in-town to accommodate the population in the next 20 years. Because of low vehicle ownership (current and projected), this paper advocates a serious attempt to develop for these new towns unique transportation networks that are efficient, economic, and safe and that accommodate the unique cultures of each of the countries.

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