TRANSPORTATION RESEARCH AND EDUCATION IN DEVELOPING COUNTRIES WITH REFERENCE TO THE MIDDLE EAST

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1. AN ECONOMIC OUTLOOK OF THE MIDDLE EASTERN REGION

Middle East has always been and is a strategically important part of the world. Today, its importance stems not only from its geographic location, but also from its growing economic potential. Middle East is a region where the oil-rich or developing nations are settled, alongside some others thriving to pass the threshold of take-off.

The title, Middle East, itself covers the countries of the South-West Asia and North-East Africa. If we include the countries at the very edges of this definition like Turkey, Sudan, Afghanistan and Pakistan, some 19 countries, including very small ones, can be counted. When we depend our analysis on some core countries, however, we can offer some figures on economic data to give a short economic account of the area.

Then, we can see that, "approximately 4 % of world's population live in this region. Again, approximately 3 % of agricultural and 2 % of industrial output of the world is produced in this area. As the rate of growth of GDP (in terms of average annual growth rate in 1973-84) has been 5.3 % for low-income countries, 4.4 % for middle-income countries, 4.5 % for upper middle-income and high-income oil exporters and 2.4 % for industrial market economies, it has been 6.1 % for the region.

In the last two decades, the region's share of international trade has grown, though slightly. The region's share of exports has gone up from 3.1 % in 1970 to 9.0 % in 1980 and it has been 3.9 in 1984, while the share in overall import figure has been 1.9, 4.1 and 3.5 respectively" (1).

If we look at the per capita national income figures of some of the leading countries in the Middle East, we can observe a sort of "a club of middle-income nations", with a few very rich members. In 1984, the per capita GNP figures (in US dollars) of some Middle Eastern countries were as follows : Egypt-720, Iran -3830, Iraq-2300, Jordan-1570, Kuwait-16.720, Lebanon-1750, Saudi Arabia-10.530, Syria-1620 and Turkey-1160 (2).

2. THE TRANSPORTATION ACTIVITIES IN THE MIDDLE EAST

As the general outlook of the transportation activities in this region is analyzed, it represents two main features :

a) The transportation network and the transport infrastructure of these countries are not adequate to meet the requirements at a decent level, especially as compared with those of the developed countries, and
b) They do not show a uniform character throughout the region

Indeed, for all modes of transportation (air, land and sea), the transportation systems of the Middle Eastern countries lag behind those of developed countries, despite some noteworthy achievements in this field by these countries. We can see this difference when we compare the density figures of road and railway networks of some Middle Eastern countries with those of some other countries randomly selected.

Table 1- Density of Road and Rail Networks (kms. per sq.km.) selected countries.(1985)

Country	Road	Rail
Egypt	0.03	0.004
Lebanon	0.68	0.041
Saudi Arabia	0.04	0.0004
Syria	0.12	0.011
Turkey	0.39	0.010
France	1.50	0.065
West Germany	1.96	0.275
Italy	0.99	0.066
Japan	2.98	0.071
Spain	0.63	0.027
U.S.A.	0.67	0.029

Source : CANDEMİR, op.cit.(1)

Although from a different angle, the same sort of gap in development can be observed in air transport. If we compare the passenger and freight carriage by air in the same countries, we can see that air transport in developed countries is well ahead of those developing countries of the Middle East.

Table 2- Passenger and freight traffic (million passenger and ton-km.s respectively) by air in some selected countries (1985)

Country	Passenger	Freight
Egypt	4,385.5	88.2
Lebanon	30.6	830.6
Saudi Arabia	15,456.0	482.0
Syria	942.0	15.7
Turkey	2,468.0	226.0
France	39,252.0	2,980.5
W.Germany	24,430.0	2,498.5
Italy	14,575.0	780.0
Japan	65,527.0	3,089.8
Spain	17,460.0	517.2
U.S.A	478,620.0	11,522.0

Source : CANDEMIR, op.cit. (1).

The second feature of the transportation developments in the Middle East is the heterogeneous character of the transportation systems of the countries of the region. As, for example, air transport has been developed both in freight and passenger carriage in some countries - e.g., Saudi Arabia, Kuwait, and Jordan -, rail transport has been the leading mode in Egypt while road transport has been developed as the dominant mode in some others - eg. Turkey, Lebanon, Syria.

In naval transport, the Middle Eastern countries do not have a pleasant situation as well.

This unhappy - but not unpromising - outlook of the Middle East in the field of transportation, brings the question of approach to the solution of the "transport problem" in this area. Our approach here is not, and should not be, to suggest well-designed transport policies which can provide ways and means of bringing quick remedies for the transport problems of the countries in question. We rather tend to stress one aspect of a positive approach to the "transport problem". It is totally devoted to the possibilities and ways of promoting research and education in transportation in the Middle East. Without it, it will be almost impossible to bring a lasting, long-term solution.

Before making an assessment of the present situation of transportation research and education in the Middle Eastern Region, it will be useful to look into the role of these important instruments in the development of transport, first in general terms and then in the context of developing countries.

3. THE TRANSPORTATION EDUCATION AND RESEARCH IN THE DEVELOPMENT OF TRANSPORT

As the field of transportation has passed through a process of rapid and dramatical changes in the last 40 years, "the environment in which transportation professionals operate has changed dramatically" (3) as well. Though the rapid change in the outlook of transportation, motivated by the revolutionary progress of technology, has started much earlier, in the 19. century, the spread of the means of modern transportation to all parts of the country and all the consequent problems of urbanization have all taken place in the aftermath of the 2. World War.

More importantly, the basic approach to the "transport problem" has changed from a position of looking solely at congestion or to the design of one mode, to a position of analysing the interrelationships between the transportation and the factors like land use, safety, energy, etc., on the one hand and the interrelationships between various modes of transport on the other. This is quite a dramatic change in the transportation analysis. This has been a change in the attitude towards the transportation problem(s) following the escalation of these problems in terms of quality as well as quantity. In other words, it must not be assumed that the solution to the problems of modern transportation is a matter of engineering work. The contemporary approach to the transport problem is a universally adopted transportation planning which depends on multidisciplinary analysis.

In response to the changing nature and needs of transportation system as a whole, the transportation education has followed the suit as well. Then, "... increased funding for public transportation, and an increased awareness of the external impacts of transportation facilities created a need for transportation professionals with special skills and attitudes. There was a need for people... who could investigate the environmental impacts of transportation facilities, who were able to manage and operate (as well as construct) public transportation services... In response to these new needs, many universities adopted a multidisciplinary approach to transportation education, and some developed special training programs for professionals who had been educated in an earlier era... During this phase, transportation research and training were often carried out in an institute or center context" (4).

Transportation planning education has passed through this transformation phase firstly in the U.S.A. After the 1950s, within a decade, transportation research centers and institutes, established within a university context have taken on the responsibility of carrying out very different transportation education curricula, depending on a multidisciplinary basis. "Transportation planning education has had its roots in civil engineering primarily because the civil engineer has historically been the professional with the major responsibility for the planning,

design and consturction of largescale transportation systems... As the scope of transportation analysis changes and becomes broader, the civil engineer is being joined by others who have relevant and complementary talents" (5).

Today, after 2 decades of experience, in developed countries, transportation education and research are being carried out at transportation centers and institutes successfully, "created at many universities in an effort to foster interdepartmental communications and to bring the resources of the university to bear in the solution of transportation problems. These organizations can represent both an efficient device for assembling a team for the performance of a specific task as well as constituting a useful mechanism for the university to interact with the real world"(6).

4. TRANSPORTATION RESEARCH AND EDUCATION IN DEVELOPING COUNTRIES

As the pace of transportation research and education has been (and is) quite rapid in developed countries, the situation is not the same in the developing world.

As a matter of fact, transportation education should be envisaged at a broader context in developing countries than that of developed world. Indeed, in the first place, unlike the developed countries which have passed through the initial stages of economic development and transformation long time ago, the developing countries' transportation problems have a greater relevance to the macroeconomic side rather than the microeconomic side which is the basic approach in the analysis of transportation problems in the developed world. Therefore, in the design of transportation education curricula in developing countries, the multi-disciplinary approach gains greater importance than a purely engineering approach, which is still the dominant form in the transportation education curricula in the developing countries. In other words, in the formulation of transportation programs, a greater emphasis must be put on the economic element.

Secondly, taking the gap in the transportation systems of developed and developing countries, the need for skilled manpower in the planning and management of transportation sector and activities is greater in the developing countries than in the developed world. Problems stemming from the development of transportation facilities and the transport system itself are wider in their range of effects in the developing countries. Therefore, the decision-makers in these countries need virtually greater support of research and skilled/trained manpower in the planning of their transport policies.

Nevertheless, the research, education and training activities in the developing countries are not developed at a level as it should be. Actually, in many of them, the transportation education and research at contemporary levels are non-existent. If we look into the reasons of this serious failure, we can see in the

first place the lack of understanding of the importance of transportation activities on the part of policy-makers and decision-makers, both in the public and private sectors of the transportation industry.

If we look at the research and development (R-D) carried out in a leading country, the U.S.A., by source of funds, we face such a picture :

Table 3- R-D by Source of funds in the U.S.A. 1970-81
(% distribution)

Federal Govnt.	67.7
State and Local Govnt.	8.1
Industry	3.9
Institutional Funds	13.6
All other sources	6.7
Total	100.0

Source : National Science Foundation, Federal Funds for Research and Development. 1970-81.

The share of the Federal Government funds in the financing of R-D can rise as much as 77 % in leading states in science like California. This example is an indication of the fact that even in countries like US, where the level of participation of the private sector/industry in the research activity is high, a more active policy of the government(s) can be needed. This is much more so in the developing countries context.

Referring back to the reasons mentioned above in this paragraph, we can argue that transportation planning must be taken as one of the most vital issues of the development of transportation in developing countries. In the accomplishment of a successful planning process in transportation, the skilled manpower is the basic element. The use of mathematical models and especially the computers cannot be taken as a substitute for a properly designed and formed transportation education program which aims at bringing up professionals capable to carry out transportation research on the multimodal basis. Therefore, we can even consider the reliance on computers and formulas without the necessary background for transportation planning as a risky approach. The tools of transportation research and planning can prove useful if and only if they are in the hands of educated/skilled professionals. Although the capabilities of the rapidly developing computers to solve large-scale problems have drastically and positively effected the transportation planning, the key role is still in the hands of educated, skilled planners. This is much more so for the developing countries where, for instance, the analytical techniques and methods of transportation planning developed by the computer era are not well known and not practiced by the planners of these countries.

If we quote Hoel again, "A working familiarity with mathematical techniques such as probability theory, linear and dynamic programming, mathematical statistics and economic models is an essential part of the transportation planner's education. These tools, coupled with a strong capability to use computers in the analysis process, are now established as the foundation of a transportation planner's education"(7), we can see the emphasis given to the educational part of the transportation planning business in the developed countries. As the skilled manpower is the lacking element in developing countries, the pressing importance of the educational aspect of the "transport problem" in these countries shows itself.

5. AN ASSESSMENT OF THE PRESENT SITUATION IN THE MIDDLE EAST

In order to assess the present situation of transportation education in the Middle East, I tried to conduct a survey through the universities of nine countries in the region - including Turkey, A questionnaire formulated for the special purpose has been sent to 20 universities in Turkey and 32 universities in the neighbouring countries - Egypt, (10), Iraq (6), Jordan (1), Kuwait (1), Lebanon (4), Saudi Arabia (3), Syria (4) and Israel (West Bank, Arab universities) (3). In the selection of universities, the criterion was the existence of engineering departments. Unfortunately, 14 universities in Turkey and only 2 universities of the rest have replied. Naturally, the level of response was totally inadequate to make a reliable assessment.

Under these conditions, how unreliable it may be, the only way for an appraisal is to depend on assumptions. Then, out of 43 universities of which I have the addresses in the 8 countries of the region, except the Turkish, 32 have engineering departments. I assume that only the engineering departments may run a transportation program in their curricula.

Out of 20 universities consulted with in Turkey 14 replied and in only 2 of them a transportation program is available - one is purely in engineering. The other has a multidisciplinary program.

With my own personal contact, I know Cairo University runs a comprehensive (and competent) transportation engineering program with a multidisciplinary coverage.

Out of this unyielding picture, all we can do is to conclude that the transportation education in the Middle Eastern region is far from being satisfactory and is not yet at a multidisciplinary basis at a contemporary level. In actual fact, a different situation can hardly be expected.

Apart from the position in universities, we do not have an information on the situation of professionals working in the transportation industry. But, we can safely argue that the situation there in the industry can hardly be better than the universities.

Here, all we can do is to try to find out ways of bringing solutions to this unpromising outlook. In such an approach, the first point to be stressed is the interaction between the (would-be) transportation programs of the universities and the transportation industry. Indeed, if the graduates of these programs cannot get employment befitting to their qualifications, it would be unrealistic to expect a successful running of such programs.Even in a country where the transportation education is at high levels and the transportation system is well organized like the U.S.A., most graduates of transportation programs of the universities and similar institutions end up in public sector or public-sector-related jobs. Although, we are not in a position to verify the situation in the Middle East yet, it can hardly be better. If the private sector is to play a leading role in the development of both the economy and the transportation sector, this must be considered a problem area.

Then, a sound approach to this problem can be to try ways which provide the active participation of the private sector. Here, for such an approach the transportation education and research should be planned and carried out in an institute or center context.

Another step to be taken in this problematical area should be to try set up top-level national bodies (like the Transportation Research Board of the U.S.A. or Transport Research Delegation of Sweden), organized by government, private sector and educational institutions, in order to be able to launch and conduct a would-be proper transportation education in the developing countries of the Middle East. One of the main functions of such an organization should be to bring the various parts of the transportation field together on a regular basis at a congressional level. Another important function of it can be to create a proper environment for a permanent cooperation and coordination between the nations of the region, which can prove to be very fruitful.

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