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**TRANSPORT AND SUSTAINABLE DEVELOPMENT
IN THE ESCWA REGION**

BACKGROUND PAPER NO. 8

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TRANSPORT AND SUSTAINABLE DEVELOPMENT

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INTRODUCTION

Transport plays a major role in the development of the ESCWA region. It was observed that most of the countries in the region witnessed a greater increase in transport demand than their respective GDP. The main reason for this is the continuing movements of people from rural areas to the newly developing urban areas. It is well established that economic activities rely on transportation. The socioeconomic benefits extended by the various transport projects include such elements as increased access to markets for local products, access to new employment centers, passage to health and recreation centers, etc. In general transport is considered as a means for strengthening local economies.

Roads are considered the prevailing mode of transport. Motor vehicles will continue to be the most convenient form of door-to-door, fast, and private transport since its evolution. It has been the main criterion on which modern land use and transport planning was based. But, by virtue of the principles of Rio Declaration, the automobile, as it is now, is not a sustainable form of transport for a number of reasons, including its direct contribution to: a) death and injury, deterioration of public health, b) millions of people who die or become chronically ill as a result of air and noise pollution, c) the social disintegration of millions of families throughout the world, d) the disruption of the ecosystems and city environment - pressure on land, e) the climate change, f) extravagant consumption and depletion of non-renewable natural resources, and g) the huge economic and social losses as a result of the aforementioned impacts. In the case of OECD countries the cost of transport externalities ranges between 4-8 per cent of the GDP. Such losses are certainly damaging the economic, social, and environmental fabrics of all countries, particularly developing ones. Experiments to ban the use of private cars implemented in Rome, Italy, and Bogota, Columbia, are examples of the beginning of the change taking place in the field of human behaviour and transport governance .

Growth in transport demand poses several implications on sustainable development. For instance, alternative fuels to the traditional sources of energy have to be sought. Public transport should be the key point within a well planned system adopted to local sustainability needs. Rational policies for vehicle ownership have to be in place. Improving traffic flows together with an integrated land-use urban planning is imperative for a successful sustainable development and mitigation of air pollution. Marketing efforts by vehicle manufacturers should emphasize improved technology of vehicles through improved performance, speed, and safety in addition to fuel economy.

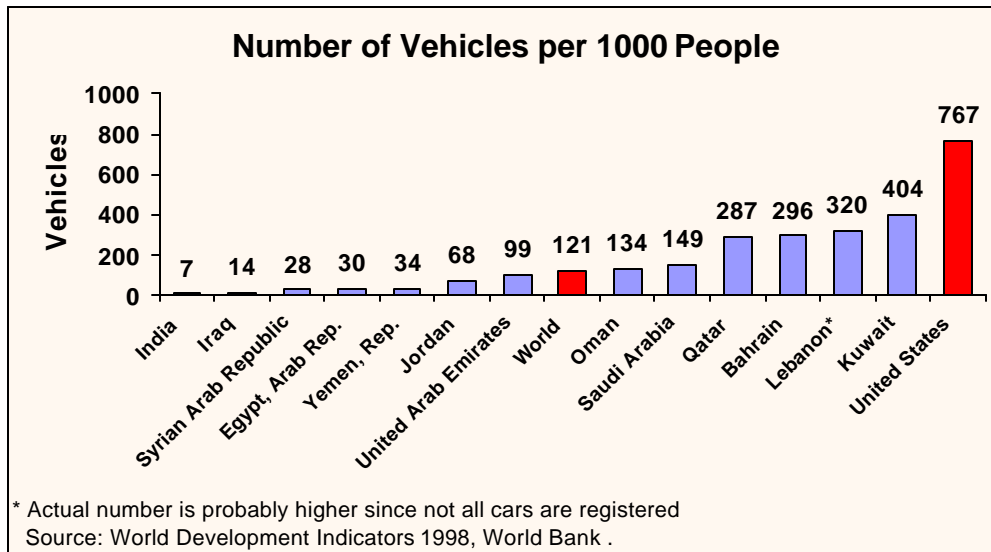
I. TRANSPORT AND SUSTAINABLE DEVELOPMENT: AN ESCWA REGION PROFILE

1. VEHICLE OWNERSHIP

It has been estimated that the number of cars (commercial and passenger) in the world will reach a staggering 1 billion in the year 2015, compared with only 550 million cars in the year 1990. ESCWA member countries have experienced similar trends. There was a sizable increase in the number of registered vehicles in ESCWA region. For instance, in the period between 1985 and 1997 the number of vehicles in Egypt and Jordan has almost doubled. On the other hand, and in a shorter period from 1989 to 1997, the number of vehicles in the Yemen Republic has approximately increased by a factor of 2.7.⁷

Figure 1 shows the number of vehicles per 1000 capita in the ESCWA member states. The figure clearly indicates a large variation in the ownership of vehicles. The world's average for the year 1998 was 121 vehicles per 1000 capita. Definitely a major factor that affects this ratio is the average income per capita. However other factors contribute also such as the tax laws and the limitation on the number of vehicles that one person can own. It is to be noted here, however, that the environmental impacts that are experienced in one country can hardly be based on this indicator alone. For instance it is well recognized that air pollution in Egypt, where the average number of vehicles per 1000 capita is 30, is much more than that of Bahrain where the corresponding number is 296⁷. It is more appropriate to measure the traffic volumes at a certain location and other related factors such as the volume to capacity ratio, the operating speeds, and the average distance of a trip.

Fig. 1. Number of vehicles per 1000 capita in the ESCWA region



In ESCWA region, as shown in Table 1 the rate of growth of the number of vehicles indicates clearly that there is a continuous rise with various rates. Some countries like Yemen are still witnessing very high increasing rates. On the average the rate of increase is high indicating that more impacts will be encountered over time which calls for appropriate strategies to be formulated.

2. RESOURCES CONSUMPTION

It is well known that the consumption of energy, raw materials, and labor resources by the transportation sector in both construction and operation results in economic impacts. The most important issue is energy consumption. It has impacts on national economy as well as individuals' expenditure. Moreover, it is well known that burning fossil fuels will result in producing pollutants that are harmful to human beings, plants, and infrastructures.

Transport sector in the ESCWA region, similar to all other regions in the world, continues to be almost 100 percent oil dependent. The only exception in the region relates to the very limited use of natural gas in Egypt and to a lesser extent in Syria.

The consumption of gasoline in the ESCWA region, which is the main fuel for vehicles, witnessed a large increase in the last years. This is mainly attributed to the sharp increase in the

number of vehicles. Table 2 indicates the total gasoline consumption (estimated in barrels/day) for the countries in the ESCWA region.

The transport sector is a major consumer of energy in the ESCWA region. This is also a phenomenon that is prevailing worldwide. However the amount of energy consumption in the transport sector as a ratio of the total energy consumption varies and ranges from as low as 29 percent in Egypt to remarkably high 74.3 percent in Qatar, as shown in Table 3.

3. EMISSION OF TRAFFIC GASES

There is a rising concern in the major cities, like Cairo and Damascus, that pollution levels from traffic operations are reaching unacceptable limits. However, in ESCWA region the issue of land transport pollution has not yet received sufficient attention. Findings of studies funded by the World Bank indicate that there is a potential for significant health problems to be associated with poor air quality and that most of the emissions are attributed to mobile sources.⁷

The yearly NO₂ emissions from the transport sector in selected countries in the ESCWA region are presented in Table 4.

The above table indicates that nearly NO₂ emissions from the transport sector in Egypt is about one third of the total NO₂ emissions while this ratio is much lower for both Jordan and Syria. Compared with the USA where the transport sector accounts for more than 70 percent of the total NO₂ emissions, it is concluded that the transport sector is not a major contributor for this emission in the region. However, it is of prime importance to avoid such occurrences.⁷

The CO₂ emissions from transport sector in selected countries in the ESCWA region are presented in Table 5. In 1980 Jordan 's transport sector accounted for about half of the CO₂ emitted but since then there has been a gradual decrease until it reached only 20 percent in 1996. Similar trends are indicated for Syria (approximately 10 percent in 1996 compared to 38 percent in 1980). Overall it is clearly indicated that the emissions of the CO₂ in the ESCWA region by the transport sector is being controlled and reduced gradually.

The emissions of other gas pollutants were also established for some ESCWA countries. For instance, the emission of SO₂ in Jordan and Syria from transport sources as indicated in Table 6 is minimal compared to USA. In fact the percentage for Jordan was even reduced from 2% in 1992 to 1% in 1996.

4. NOISE POLLUTION

In ESCWA region, noise from traffic has not yet been considered as a major environmental problem that warrants strict measures. However, with the increasing reliance on road transportation over the years and the subsequent rise in the number of operating vehicles, noise pollution will definitely require more attention and regulatory steps.

The effects of transport noise are not well understood yet. Also there are no fully satisfactory measurements of noise and nuisance it causes. Several regulations and standards were set. However, in ESCWA member states Lebanon and Egypt have limited noise intensity in different Zones⁷, as indicated in Tables 7 and 8.

5. ACCIDENTS

There is a growing concern in the ESCWA region about the socio-economic, environmental, and health impacts of road crashes on sustainable development, and the need to address this potential problem in its totality in order to reduce the human suffering and the drastic economic losses to the national economies. Total external costs of road crashes are not considered in the traditional transportation planning methodologies and evaluation. For example the loss of working power and salient costs related to human suffering, the related effects on poor communities, particularly women, are not included. The externalities of road crashes are directly related to the Agenda 21's polluters' pay principle. The European Union has taken a number of actions in the previous years. Some of the findings show that road crashes represented the larger share of the transportation externalities (4.6 percent of the GDP of 17 European countries).

The number of accidents that occurred in the ESCWA countries, depicted in Table 9 indicates that there is a varying trend in the rate of increase in the number of fatalities and injuries. Some countries like Bahrain are showing positive trends. The number of both fatalities and injuries is decreasing with time indicating that the proposed safety schemes are satisfactory. On the other hand, Jordan is witnessing a dismal situation with respect to accidents. From 1994 until 1997 (about four years) there was an increase of about 40 percent in the number of fatalities.

6. AUTOMOTIVE INDUSTRY

Only a few countries in the ESCWA member countries are in possession of automotive assembly plants. The most remarkable are those set up in Egypt during the past decade. Thus, the number of local vehicle assembly facilities in Egypt now stands at eleven plants, only one of which is in the public sector. In 1997, these companies produced 14,500 passenger cars, 13,100 trucks, 2,350 heavy-duty cars, 1,000 mini and minibuses, 450 standard buses and 320 tourist buses¹. This industry is estimated to employ 20,000 workers.

The benefits of establishing assembly plants in the ESCWA member countries are multifaceted but conditional for the most part upon contractual terms and the availability of supportive policy regimes. Thus, the erection of assembly facilities may lead to effective renovation of automotive fleets with consequent technology dissemination and commensurate positive results throughout the economy. Naturally, a good deal of these benefits will depend upon the terms adopted in the agreements underlying the establishment of the assembly facilities. Furthermore, by virtue of their presence in the region, such facilities may significantly contribute to considerable environmental consequences. However, this too will be contingent upon the level of innovation and sensitivity to environmental factors allowed by technology transfer clauses in the above-mentioned contracts.

II. TRANSPORT TECHNOLOGIES

1. CLEANER FUEL TECHNOLOGIES

Fossil fuel operated internal combustion engines are the predominant, indeed the sole, source of automotive power in the ESCWA member countries. Vehicles in use, mostly passenger cars, busses and trucks, rely on two principal oil derivatives, gasoline and fuel oil.

Natural gas is increasingly being used in the transport sector throughout the world. The fact that it constitutes a cleaner fuel source is at least partly responsible for its preferability. On the other

hand the need to introduce considerable engine design changes and modify fuel distribution facilities are believed to have encumbered its proliferation. Thus, the transport share of worldwide gas consumption stood at a mere 3.9% in 1997². Additionally, natural gas constituted only 2.5% of total fuel consumption by the transport sector in the same year.

Available reports indicate that natural gas was introduced as an automotive fuel in only one ESCWA member country, namely Egypt. Thus, in 1992, the Egyptian Ministry of Petroleum launched a programme aimed at replacing gasoline in the transport sector with natural gas. However, only around 19,000 vehicles, including passenger cars, and public transport vehicles, were in fact converted to natural gas³.

The fact that the use of this alternative fuel has so far been the subject of positive feedback, in terms of its economic and environmental impact, is likely to contribute to its expanded utilization with time. It may also be assumed that the programme launched by Egypt has contributed to the accumulation of local technological expertise, regarding engine design modification and maintenance procedures as well as improved knowledge in the organization of supply and distribution networks allowing further expansion in the dissemination of natural gas as an automotive fuel in Egypt as well as the region. The fact that the countries of the Middle East account for a significant proportion, 7.6%, of the world's natural gas output, should provide further impetus for such expansion.

With respect to the use of unleaded fuel, the ESCWA member countries have only recently joined global efforts aimed at phasing out lead additives in gasoline with a view to reducing human exposure to lead poisoning. Thus, Egypt, the most populous among the ESCWA member countries, introduced unleaded gasoline as recently as in 1996. Nevertheless, a plan being implemented with assistance from the US Agency for International Development (USAID) assisted Egypt in its plan to phase out lead by 1999⁴.

In Kuwait, unleaded gasoline was introduced as late as October 1998. The Kuwaiti government has been reported as planning to phase out leaded gasoline by October 1999. In order to facilitate its replacement by unleaded gasoline, plans have been made to double its cost to the consumer.⁴ Saudi Arabia is also reported as planning to convert to unleaded gasoline by 2002-2003⁵.

2. TECHNOLOGY TRANSFER AND DEVELOPMENT

Several countries in the region, including principally Saudi Arabia and Egypt have active research programmes aimed at the development of alternative energy sources. Very few of such programmes appear to target the transport sector, however.

In essence, there is an urgent need to acquire a much higher rate of technology transfer and local technology development of a variety of areas with impact upon the transport sector's economic and environmental performance. In particular technologies essential for enforcing improved safety, fuel consumption and emission standards are urgently needed. Furthermore, there is a need to acquire modern means that facilitate the use of common transport systems, including subway systems in urban centres. The onus for initiating action along these lines will naturally have to fall on the shoulders of governmental and public sector institutions. There is also a need to acquire technological capabilities for modern maintenance and continuous improvement of current vehicle fleets.

In general, the trend towards liberalization of ESCWA economies highlights the role of the private sector in such endeavours. Moves in the ESCWA member countries towards privatization auger well for an enhanced role by the private sector in solving the sector's problems. On the other hand, it is not expected that this role will develop much further in the absence of relevant environmental regulations and enforcement measures.

Many developments in the transportation sector in the developed countries have come as a result of incorporating a variety of inputs from fields of technologies that are extraneous though supportive to the sector. Some of the more prominent developments in transport infrastructures as well as actual improvements in transport equipment are indebted to the application of advanced information and communications technologies (ICTs) in the field of transport, for example.

The ESCWA member countries will need to enhance the influx of similar developments if their transport systems are to achieve the standards required by the trend towards globalization. Some of these developments will necessarily need to be closely related to manufacturing and maintenance technologies as applied to automotive vehicles and to systems dedicated to measuring their environmental impact and fuel economies. Inputs provided by new materials technologies possess a prominent position in this arena. Other equally, if not more important, developments, however, will need to target transport infrastructures and operations, in general. It is the latter set of developments that are expected to benefit greatly in the following few years from greater emphasis on the acquisition of modern ICTs including geographic information systems (GIS) and remote sensing. Mastery of a variety of electronic data transmission and analysis systems including Internet related modes of information networking, will also need to receive much greater attention.

III. TRANSPORT SYSTEMS AND NETWORK

1. INTEGRATED TRANSPORT SYSTEM FOR ARAB MASHREQ : ITSAM-NETWORK

ESCWA is currently undertaking a long-term plan to develop an integrated transport system in the region, known as the Integrated Transport System in the Arab Mashreq (ITSAM), which was endorsed upon the recommendation of the Committee on Transport, in a statement issued at the twentieth session of ESCWA in May 1999.

The Committee on Transport was formed pursuant to a resolution adopted at the nineteenth session of ESCWA in 1997. It serves as a regional institution enjoying legislative competency and its secretariat is represented by the Transport Section of the Sectoral Issues and Policies Division of ESCWA, which is responsible for the execution of the programmes of action recommended by the Committee.

The concept of ITSAM is based on the recognition of the strategic importance of the transport sector – including land, sea and air transport networks – in promoting and supporting sustainable development activities in the ESCWA region. The working framework of the System consists of three principal components, namely:

- (i) An integrated transport network (ITSAM-NETWORK) comprising the principal modes of transport in the ESCWA region;
- (ii) An associated information system (ITSAM-INFOSYS) to serve as a regional database facility for use by ESCWA member countries;

- (iii) An analytical framework (ITSAM-FRAMEWORK) for issue analysis and policy formation.

The development of ITSAM will require sustained and deliberate efforts in order to make the system viable. Defining the issues pertinent to transport integration and sustainability arriving at policy recommendations at the regional level will require addressing the many concerns related to infrastructure, traffic flows, harmonization of regulations, the impact of regional and international agreements and operational efficiency, among others.


It was in its preliminary endeavours to initiate work on ITSAM that ESCWA in its 1998/1999 biennium work programme, convened three expert group meetings on the subject.

Published reports on those meetings, as well as the “Report on the first session of the Committee on Transport” (E/ESCWA/C.1/20/7/Add.6) and the regional transport network map produced by ESCWA in June 1999, are available from ESCWA upon request. The ITSAM regional transport network comprises the major international road and railway (north-south and east-west oriented) routes, seaports and airports in the region. ESCWA is presently proposing a multilateral regional agreement on the international road network of ITSAM to be adopted by its member countries. The proposed agreement specifies the adopted road network and its unified technical specifications, signs and signals.

As recommended by the Committee on Transport, an action plan is to be prepared that will include defining priorities and the distribution of roles among the regional organizations concerned, such as the League of Arab States, the Gulf Cooperation Council (GCC) and those regional organizations and associations involved with the transport sector. The plan is expected to provide a framework for the mobilization of coordinated efforts and the formulation of strategies and mechanisms geared to the development of an integrated transport system that will facilitate the flow of intra-regional and international transport of freight and passengers throughout the ESCWA region and at its land, sea and air border crossing points.

2. TRANSPORT FACILITATION

Trade facilitation and liberation as a result of the globalization trends have imposed special requirements on transport. Transport facilitation is the physical expression of trade.

In this respect ESCWA has already completed in 1999 a study on the applications of Electronic Data Interchange (EDI) and the United Nations EDI standards for the facilitation of administration, commerce and transport (UNEDIFACT) in the ESCWA region. The study reviewed existing applications within and outside the region and made recommendations for the enhancement of such applications. ESCWA is currently undertaking a more comprehensive study on transport facilitation in the region. The study involves a detailed review and comparative analysis of existing practices and procedures for imports, exports, transit and re-export processes of international freight movements within and between selected countries in the region. The study would recommend a more simplified and harmonized international trade transaction model for future practice in countries of the region. 

IV. POLICY OPTIONS

1. USE OF VEHICLES WITH IMPROVED TECHNOLOGY

Replacement of old vehicles with fleet that uses improved technologies is a matter of controlling sustainability at the source. Some experts noted that marketing efforts by many manufacturers now emphasize power, speed, acceleration, and accessories (such as air-conditioning and radios) in contrast to the emphasis on fuel economy in the 1970s. This situation undermines improved levels of fuel economy and emissions, and efforts are required from national and international authorities to counter this trend.

Different options are available to increase engine efficiency and flexibility of use and to decrease fuel consumption, weight and maximum power, while maintaining sufficient performance, in accordance with limits prevalent in the industrialized countries. For example, combining the use of high-power density engines, turbo and supercharging, electronic control of fuel injection and engine regulation, and electronically controlled continuously variable transmissions, can maximize engine power where needed, while retaining the fuel economy characteristics of a lighter and less powerful engine. Other interesting engine developments include manufacturing compact and efficient two-stroke engines with electronic fuel injection, efficient and clean "lean burn" engines, for which problems of catalyst durability under poor maintenance conditions could be overcome. Beyond the year 2000, the experts consider that the implementation of the best available technologies, together with increased consumer demand for highly efficient and clean automobiles, could lead to further improvement in the fuel efficiency of cars on the order of 50-60% above today's levels.⁷

Since ESCWA member countries import most of their vehicles, it will be necessary to modify their specifications in order to introduce vehicles of better quality and with cleaner engine to replace older ones with inferior technology. However, this would have a major economic cost for developing countries, which would find this very difficult to implement. Table 10 gives an example of the problem associated with the age of the operating vehicle fleet in Syria. The number of passenger cars that are operating in the streets are 24 years old and more. In Egypt about 65 percent of the vehicles are 10 years old or more and about 25 percent of these vehicles are more than 20 years old. Jordan has taken a positive step to replace the old fleet of taxis operating in its major cities. The Government has granted taxi owners an exclusive exemption from taxes if they opt to replace their old vehicles with new ones.

2. USE OF ALTERNATE FUELS

The use of alternative fuels including natural gas, methanol, ethanol, electricity, and differing qualities of petroleum-based fuels should be considered. Natural gas (whether compressed natural gas CNG or liquefied natural gas LNG) beside its free pollution advantage it has proven to be economically feasible. So, it has witnessed a very large use recently and it is estimated that the total number of vehicles using this fuel exceeds one million⁷. In Egypt the use of natural gas has witnessed a big stride. Currently there are more than 19,000 vehicles that have been converted to use natural gas and the existing number of fueling stations have exceeded 20. Besides, Egypt and USA are jointly implementing the Cairo Air Improvement Project (CAIP). One of the aims of this project is to employ CNG engines in public transportation busses. Rolling chassis are being imported and a local manufacturer is building and integrating the bodies⁶. In Syria serious considerations are being directed towards the use of natural gas fuel.

3. CLEAN FUEL TECHNOLOGIES

Although, developed countries have phased out lead from gasoline pioneered by Japan (1975), and the US (1986), the majority of the developing countries, including those of the ESCWA region, are still using leaded gasoline. Education and policy formulation are the essential elements in the phasing out of lead from gasoline. The overwhelming health gains and maintenance savings associated with the phasing out of lead from gasoline should encourage all the ESCWA government to take a firm action in this respect.

4. PROMOTING PUBLIC TRANSPORT

Public transport should be the key point within a well-planned and integrated transportation system adapted to local needs for sustainable development. Major steps have been taking place or under serious considerations in some major cities in the ESCWA region to promote public transport facilities. For instance, the construction of the underground (metro) system in the city of Cairo has eased traffic congestion considerably. In addition, the city of Alexandria is considering constructing underground (metro). Other examples in the region are the cities of Damascus and Amman which are considering constructing light rail systems. Studies undertaken as early as 1985 and in 1997 call for the construction of a 45-km line (three diagonal routes and one circumferential) with a total of 36 stations in Damascus.⁷

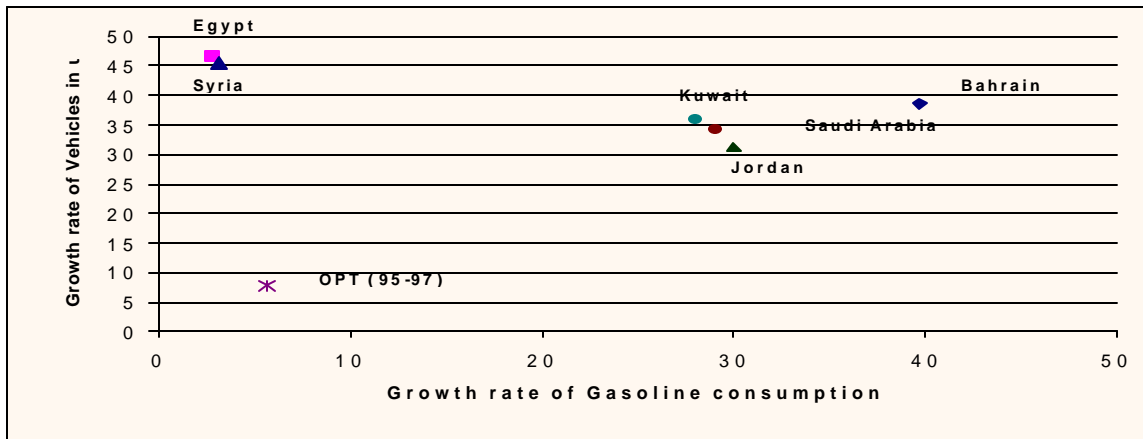
5. MANAGEMENT OF VEHICLE OWNERSHIP

No sustainable transport plan will be successful unless it tackles the problem of controlling the number of registered vehicles. The increase in fuel consumption is mainly attributed to sharp increase in the number of vehicles. Figure 2 shows the relationship between the growth rate of vehicles in use and the growth rate of Gasoline consumption in selected ESCWA member states in the period ranging from 1985 to 1996. It indicates that for these countries, except for Syria and Egypt, the growth rate of vehicles in use increases proportionally with the growth rate of Gasoline consumption as expected. However for Egypt and Syria, the figure indicates that the rate of growth in gasoline consumption was not influenced by the increasing rate of vehicle ownership. This could be explained by the fact that other fuels such as Diesel are being more used as a source of energy for vehicles. In Addition these two countries have witnessed a dependency on public transport more than others. In fact, the average km per passenger car in these two countries has decreased over time and therefore neutralizing the effect of the increase in the vehicle fleet.⁷

6. IMPROVING TRAFFIC CONDITIONS

For ESCWA developing countries in specific, and for others in general, it must be recognized that, for a sustainable transport policy to be successful, it is imperative that it would not be based on technological improvements alone as they cannot compensate for growing demand. Improving traffic flow operations and circulation and providing facilities and transport infrastructures can result in smooth traffic flows. Improving access to, and mobility within, a central area, but at the same time relieving the adverse impacts of heavy automobile use and enhancing the pedestrian environment are only a few examples of improved traffic conditions.

Figure 2. Growth rate of vehicles in use versus growth rate of Gasoline consumption in selected ESCWA member states



Source: Economic and Social Commission for Western Asia, *Harmonization of Environmental Standards in the Transport Sector in ESCWA Member Countries*, E/ESCWA/TRANS/1999/5, 25 October 1999.

It is to be stressed here that improved traffic management in urban areas will provide the most cost-effective technique for reducing transport-related pollution. It has been observed in many large cities of ESCWA countries that simple changes, such as changing two-way streets into one-way streets, and changing direction of traffic of certain major roads during peak hours to provide more lanes in the direction of heavy traffic, has resulted in substantially smoother traffic flows. In some extreme cases where the urban traffic becomes extremely heavy, such as Beirut or Cairo, use of stricter measures might be called for.

7. INTEGRATING LAND USE PLANNING

Urban planning can best be utilized to aid in abating the detrimental effects of transportation on environmental quality. Land-use and transport are closely related parts of the human activity system. Bringing schools, factories, offices, shops, recreational and other facilities into or near activity centers will minimize the need to travel far or frequently for work and other activities. Developing countries have an advantage over developed countries in the sense that they are in the process of building or completing their infrastructures. They therefore have the unique advantage of their urban expansion with appropriate incentives for more efficient and environmentally sound patterns.

8. USE OF INFORMATION TECHNOLOGY

Recent information technology (IT) advances offer a range of modern user services for increasing the efficiency of travel and transportation of freight. Information technology help in many uses as follows:

- Systems giving buses and trams priority at traffic signals, helping to speed up public transport.
- Systems to monitor bus, tram, and train movements, allowing control of services and the provision of real time information.

- Systems to provide up-to-the minute information on routes, timetable, station facilities whether via call centers or direct through the Internet.
- Convenient system-wide ticketing suited to today's electronic cash society.
- Systems for port and customs management, operation, and administration.

Use of IT in most ESCWA countries is still limited. One of the reasons is the inappropriate communication infrastructure. However, Dubai has achieved a great progress in this field. The port of Dubai has used the state-of the-art IT with EDI for container terminal management, port operation, ships' movement control, and customs processes. Moreover, Dubai Transport Corporation (DTC) provides taxi services using an automatic vehicle location (AVL) and tracking system based on Trimble's advanced GPS (Global Positioning System) board technology. Some ESCWA member countries, such as Jordan, Lebanon, Saudi Arabia and Egypt, have also taken steps towards using IT in port and custom operation and management.

9. SAFE MOBILITY

The negative transportation impacts includes, inter alia, road crashes, social disintegration, pain, suffering, and chronicle illnesses. Globally, 1.25 million persons are killed annually in road crashes, and 50 million get seriously injured resulting in millions of disable persons, and several millions of victim(s) families living in misery. It appears that social costs have received less attention. The governments of the region to combat road crashes effective results have to exert continuous efforts. Sustainable Safe Mobility initiatives using the principles of Agenda 21 would have to be formulated in order to ease the collective transportation social impacts facing the ESCWA member countries and their societies.

V. REGIONAL, INTERREGIONAL AND INTERNATIONAL COOPERATION

COOPERATION AMONG UN-REGIONAL COMMISSIONS IN THE FIELD OF TRANSPORT

The first meeting of the Heads of Divisions Responsible for Transport of the United Nations Regional Economic Commissions was held from 7 to 9 December 1999, in Cairo, Egypt, hosted by the Egyptian Ministry of Transport. The purpose of the meeting was to initiate a dialogue among the five secretariats of regional commissions of the United Nations on possible land and land-cum-sea transport linkages and to draw up an action plan in order to assist their member countries to fully participate in the rapidly globalizing economy.

There was general convergence of views and agreement that a coherent, complementary and monitorable action plan was also needed to guide these efforts. This action plan should be regarded as tentative and indicative that needs to be progressively refined, as more information is gathered, studies carried out and consultations made with member States. To implement this action plan, corresponding activities should be reflected in the work programme of each regional economic commission.

It was agreed that the elements of the action plan, based on the various proposals, should respond to the needs of member States for sustainable development. It should provide a rational framework for a consistent and practical programme. The elements of the programme should therefore be conceived as adding value to the projects and policies to be undertaken by these States.

On the other hand, the ongoing processes of globalization, and liberalization of national economies have greatly enhanced the scope for intra-regional and interregional trade and tourism. The developing countries are affected to a varying degree by both these processes, and many of them could not fully participate in it to share the benefits due to inadequate transport infrastructure and services. This has created a great demand for efficient and well integrated transport infrastructure and services to enable those countries to take part in the development processes effectively.

In light of the above background, and in pursuance of a decision taken at the Meeting of the Executive Secretaries of Regional Commissions in September 1999, the meeting of Directors responsible for Transport in the Regional Commissions strongly recommended that a "**programme proposal**" be prepared for mobilizing the funding support, to assist the countries concerned in their capacity building.

The implementation of the programme which is already submitted for funding from the UN Development Account will enable the countries to identify potential interregional transport linkages and their expected impacts on regional and economic development, by undertaking a series of technical studies under a common methodological framework. That would definitely contribute positively to the sustainable development of the respective countries.

REFERENCES

1. US & Foreign Commercial Service and US Department of State, *"Egypt Automotive Feeder Industries"*, Industry sector analysis series, 1998.
2. International Energy Agency, *"Key World Energy Statistics"*, 1999 edition.
3. www.e-petroleum.com, *E-Petroleum online magazine*, October 1999 issue.
4. World Bank, *"World Bank Support for the Global Phaseout of Lead from Gasoline; Issues, Progress and Challenges"*, 1999.
5. US & Foreign Commercial Service and US Department of State, *"Saudi Arabia Unleaded Gas Trends"*, Industry Sector Analysis Series, 1999.
6. Samir Mouafy, *"Egypt's Strategies to Reduce Emissions from Motor Vehicles"*, International Roundtable on Transportation Energy Efficiency and Sustainable Development, Cairo, Egypt, 5-7 December 1999.
7. Economic and Social Commission for Western Asia, *Harmonization of Environmental Standards in the Transport Sector in ESCWA Member Countries*, E/ESCWA/TRANS/1999/5, 25 October 1999.

ANNEX (A)
STATISTICAL TABLES

ANNEX (A)
STATISTICAL TABLES

Table 1. Rate of annual growth in vehicles in the ESCWA region

Country	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Bahrain	9	7	4	2	4	5	4	3	7	7	6	4	3	...
Egypt	...	...	6	4	2	3	5	3	4	16	7	8	4	5
Iraq	...	9	7	9	9	6	8	-7	2	1	5	...	...	...
Jordan	...	4	4	4	2	0	1	1	6	1	1	6	9	2
Kuwait	...	7	-2	4	4	5	9	4	3	2	4	5	5	
Lebanon	...	...	...	...	...	...	...	...	...	9	9	4	4	4
Oman	...	...	...	...	4	7	9	11	7	7	5	3	5	11
Qatar	...	...	...	6	6	3	4	11	3	6	2	4	6	9
Saudi Arabia	9	5	3	3	3	8	3	4	3	2	5	4	3	...
Syria	1	-4	5	1	3	-3	1	1	6	16	9	11	8	...
U.A.E	5	6	-3	3	6	13	-3	2	11	14	...	...	...	...
Yemen Republic	...	...	...	...	...	...	3	13	11	15	7	12	13	18

Source: Based on data compiled by the Statistics Division of ESCWA.

Table 2. Total gasoline consumption (1000 Barrels/day)

Country Name	1975	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997
Bahrain	1.2	2.6	4.1	5.2	5.4	5.8	6.2	6.4	6.5	6.8	10.3
Egypt, Arab Rep.	15.3	27	45.6	50.6	48.5	45.8	43.7	43.7	45.4	46.9	48.5
Iraq	14.6	33	51	74	55	70	68	66	68	71	74.1
Jordan	3.6	6.3	8.4	8.4	8.9	9.8	10.1	10.6	11.4	12	12.6
Kuwait	10.9	20.9	26.2	18.4	14	26.9	29.9	31.8	34.3	36.4	38.4
Lebanon	11.2	13.9	17.2	14	17.5	24.2	28.1	29	30.9	32.6	34.3
Oman	2	4.8	9.2	11.2	12.2	13.1	13.8	13.9	14.4	14.9	15.7
OPT	...	...	...	...	...	...	...	...	5.49	5.82	6.2
Qatar	1.6	3.9	5.4	6.7	6.9	7.3	7.6	7.7	10.5	8.4	9.2
Saudi Arabia	26.6	87.3	142.1	157.5	150.7	169.4	183.1	197.9	178.6	200.5	210.5
Syrian Arab Republic	9.3	12.3	18.4	16.3	16	16.8	17.3	18.4	18.7	19	19.6
United Arab Emirates	5.1	13.6	18	24	26	28	29	31	33	36.6	40.6
Yemen, Rep.	3.2	5.2	5.2	15.3	19.4	21.2	22.2	22.2	24.4	23.2	24

Source: Annual Statistics Report 1998, OAPEC.

Table 3. Percentage of Oil Consumption in the Transport Sector in Selected ESCWA Countries in 1995

Country	Million bl.o.e	Transport % of total energy consumption
Bahrain	5654	30.7
Egypt, Arab Rep.	49456	29
Iraq	45023	32
Jordan	9192	41
Kuwait	14282	39.8
Lebanon	18478	50.6
Oman	8284	64.1
Qatar	4637	74.3
Saudi Arabia	122570	46.9
Syrian Arab Republic	19725	29.3
United Arab Emirates	33215	49.4
Yemen, Rep.	16605	50.66

Source: *Energy Statistics Yearbook for the Middle East and North Africa 1997*, ESCWA/ENR/1997/13

Table 4. NO₂ Yearly emissions in Transport for selected countries (kt)

Country		1980	1990	1992	1993	1994	1995	1996
Egypt	Transport Emissions	0.09	0.15	0.16	0.16	0.16	0.18	0.19
	Total Emissions	0.3	0.52	0.48	0.46	0.48	0.53	0.55
	%	30	28.8	33.3	34.8	33.3	34.0	34.5
Jordan	Transport Emissions			2	2	1.35	1.4	1.45
	Total Emissions			18.4	18.4	22.61	24.53	25.6
	%			10.9	10.9	6.0	5.7	5.7
Syria	Transport Emissions		0.19	0.26	0.3	0.32	0.3	0.28
	Total Emissions		1.25	1.52	1.55	1.44	1.45	1.39
	%		15.2	17.1	19.4	22.2	20.7	20.1
USA	Transport Emissions		132	136				
	Total Emissions		179	179				
	%		73.7	76.0				

Source: World Energy Council; [Http://www.worldenergy.org/wec-geis](http://www.worldenergy.org/wec-geis)

Table 5. Yearly CO₂ emissions in transport in selected ESCWA countries

Country		1980	1990	1992	1993	1994	1995	1996
Egypt	Transport Emissions	10.0	18.0	19.0	19.0	20.0	22.0	22.0
	Total Emissions	39.0	75.0	72.0	70.0	73.0	83.0	85.0
	%	25.6	24.0	26.4	27.1	27.4	26.5	25.9
Jordan	Transport Emissions	2.3	3.8	3.9	4.0	2.7	2.8	2.9
	Total Emissions	5.0	10.2	11.0	11.4	11.7	12.7	13.3
	%	46.4	37.4	35.6	35.2	23.1	22.0	21.7
Saudi Arabia	Transport Emissions	22.3	28.6	29.9	32.8	35.6	35.0	37.1
	Total Emissions	98.1	168.6	213.2	224.0	218.6	225.0	248.7
	%	22.7	17.0	14.0	14.6	16.3	15.5	14.9
Syria	Transport Emissions	5.7	5.0	4.3	4.1	4.1	3.8	3.9
	Total Emissions	15.0	33.3	36.0	35.9	37.3	39.1	40.4
	%	38.2	15.0	11.9	11.4	11.0	9.6	9.6
Yemen	Transport Emissions	2.5	3.9	5.2	4.1	4.3	4.4	4.2
	Total Emissions	3.9	7.6	9.9	7.8	8.3	8.3	8.3
	%	64.1	51.3	52.5	52.6	51.8	53.0	50.6
USA	Transport Emissions	1257.5	1462.8	1468.2	1493.9	1548.0	1583.0	1625.0
	Total Emissions	4785.3	4873.4	4924.6	5095.0	5153.7	5194.5	5324.5
	%	26.3	30.0	50.2	29.3	30.0	30.5	30.5

Source: World Energy Council; [Http://www.worldenergy.org/wec-geis](http://www.worldenergy.org/wec-geis)

Table 6. Yearly SO₂ emissions in transport in selected ESCWA countries

Country		1980	1990	1992	1993	1994	1995	1996
Jordan	Transport Emissions			0.5	0.5	0.3	0.31	0.32
	Total Emissions			24.7	25.9	29.6	30.97	31.92
	%			2.0	1.9	1.0	1.0	1.0
Syria	Transport Emissions	9.71	13.04	14.94	16.01	15.27	13.94	
	Total Emissions	237.58	263.29	262.98	258.51	242.22	222.48	
	%	4.1	5.0	5.7	6.2	6.3	6.3	
USA	Transport Emissions	604	745	756	716			
	Total Emissions	22786	20638	20022	20287			
	%	2.6	3.6	3.8	3.5			

Source: World Energy Council; [Http://www.worldenergy.org/wec-geis](http://www.worldenergy.org/wec-geis)

Table 7. Lebanese Ambient Noise Limits for Intensity in different land use Zones

Receptor	Daytime dB (A)	Evening dB (A)	Night dB (A)
Industrial Areas (heavy industries)	60-70	55-65	50-60
Commercial, administrative and "downtown" areas	55-65	50-60	54-55
Residential areas, including some workshops or commercial businesses or on public roads	50-60	45-55	40-50
Residential areas in the city	45-55	40-50	35-45
Residential suburbs having low traffic	40-50	35-45	30-40
Rural residential areas (hospitals and gardens)	35-45	30-40	25-35

Source: Ministry of Environment, Resolution # 1/52, Official Gazette issue # 45, 12/9/1996

Table 8. Egyptian Ambient Noise Limits for Intensity in different land use Zones

Receptor	Daytime dB (A)	Evening dB (A)	Night dB (A)
Industrial Areas (heavy industries)	60-70	55-65	50-60
Commercial, administrative and "downtown" areas	55-65	50-60	45-55
Residential areas, including some workshops or commercial businesses or on public roads	50-60	45-55	40-50
Residential areas in the city	45-55	40-50	35-45
Residential suburbs having low traffic	40-50	35-45	30-40
Rural residential areas (hospitals and gardens)	35-45	30-40	25-35

Source: The Egyptian experience in applying environmental norms and standards in the areas of Electricity generation, transmission and distribution, Eng. Maher Bedrous. Background paper in the expert group meeting on the Harmonization of environmental standards in energy sector, Cairo, 1999.

Table 9. Number of car accidents and fatalities in some selected ESCWA countries

Country	1992		1993		1994		1995		1996		1997	
	# of Acc	# of Fat	# of Acc	# of Fat	# of Acc	# of Fat	# of Acc	# of Fat	# of Acc	# of Fat	# of Acc	# of Fat
Bahrain	28073	69	32004	56	31019	63	29083	53	27899	57	...	...
Jordan	...	...	24799	440	26837	443	28970	469	33784	552	39005	577
Kuwait	...	...	19820	289	21697	289	24045	294	24912	285	26322	356
Lebanon	...	...	...	...	...	...	...	...	...	...	3315	357
Oman	13617	218	11754	372	11754	372	11025	399	9456	413	8444	549
Qatar	41100	116	41615	84	39719	52	41691	99	43263	89	49943	96
Saudi Arabia	...	...	...	...	...	...	...	...	167265	3123	...	...
Syria	...	...	17407	1198	16692	1297	15649	1524	14297	1386	14694	1256
UAE	...	...	...	...	19397	600	18071	563	16610	358	...	...
Yemen	...	...	...	...	...	...	7346	1369	7303	1267	8332	1223

Source: Economic and Social Commission for Western Asia, *Harmonization of Environmental Standards in the Transport Sector in ESCWA Member Countries*, E/ESCWA/TRANS/1999/5, 25 October 1999.

Table 10. Age distribution for vehicles in Syria

Vehicle Type	% Of fleet older than	
	13 years	24 years
Passenger cars	60.5	24
Buses and minibuses	40.4	9.4
Pickups	57.4	6.5
Trucks	68.2	19.2

Source: Economic and Social Commission for Western Asia, *Harmonization of Environmental Standards in the Transport Sector in ESCWA Member Countries*, E/ESCWA/TRANS/1999/5, 25 October 1999.

ANNEX (B)
ITSAM-NETWORK