

TRANSITIONING TO THE GREEN ECONOMY: THE ARAB TRANSPORT SECTOR POLICY BRIEF

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ABSTRACT

This paper highlights the existing policies, current practices, and major trends for the transport sector in Arab countries, and then discusses their current implications on development, social integration, and the environment and the need to adopt non-conventional approaches and measures to provide transport systems that promote sustainable development. The paper explores the potential of developing policies, incentive measures, and green strategies to promote innovative practices for the movement of people and goods, including public transport and, as a result, eliminate the negative impacts from the inappropriate practices nationwide. The paper also addresses establishing a green transport infrastructure network at the regional scale.

Keywords: Arab transport, environmental sustainability, green economy, green mobility, sustainable transport, transport policy.

1 INTRODUCTION

“Transportation is globally considered to be the largest sector in the world in terms of financial turnover, resource consumption, and workforce” [1] and very much associated with economic growth. Recently, international organizations such as the United Nations (UN) have identified green transport as “one of the main sectors addressed in the green economy approach, a new economy model based on ecologically compatible use of resources, economic efficiency, and social justice” [2]. Most Arab countries have extensive road networks, along with important and much expanded and developed facilities for air and sea transport. Although those transport systems are relatively well developed, serious capacity gaps, congestion, and pollution problems do exist. As recommended by the World Business Council for Sustainable Development [3] it is essential for governments to commit to and adopt long-term policies to provide safe, affordable, and efficient transportation systems that increase energy efficiency and reduce pollution, congestion, and adverse health effects while limiting random urban expansion. In this regard, the paper recommends different policies that contribute to transitioning to the green economy in the Arab countries by addressing the green transport requirements.

2 CURRENT PRACTICES IN THE ARAB TRANSPORT SECTOR

2.1 Current trends in the Arab region transport sector

“Urbanization, or urban population, in the Arab region is at 57.5% compared to the world’s average of 49.1%. It ranges from around “27.7% in Yemen up to around 86% in Djibouti and Lebanon” [4]. “More than six cities in the Arab region have over three million citizens and Cairo has more than ten million” [5]. This high level would generally result in high traffic densities in major cities, and consequently high emissions, noise, and land degradation. With almost 60% of its population living in cities, the region is far more urbanized than East Asia or South Asia. As such, most major Arab cities have experienced rapid growth in urban transport demand and in motorization. Yet, the development of urban transport systems, and particularly public transport, has lagged behind, and this has fostered

excessive reliance on private automobiles. Consequently, many of the region's large urban areas, where the bulk of GDP is produced, face increasingly difficult transport problems with a high degree of traffic congestion, reduced mobility, and deteriorating air quality. Twenty-two percent of greenhouse gas emission in the Arab region is due to the transport sector [1]; thus, environmental policies and regulations are nonexistent or not sufficiently enforced.

Other transport-related issues include the relatively cheap prices of gasoline due to government subsidies in many Arab states, an ageing polluting vehicle fleet (the average age of cars in Arab countries is 15 years) in most of the cities except for the Cooperation Council for the Arab States of the Gulf (GCC), inefficiency of traffic management modes, insufficient public awareness, poor urban and physical planning resulting in long commuting distances between residential and service/work/recreation areas, and high road traffic injury rate as illustrated in Fig. 1.

2.2 Arab strategies and policies in the transport sector

In principle, policies and measures envisioned by Arab countries aim to some extent at creating sustainable transport systems. "These include the development of road transportation master plans, modern efficient traffic management systems improvement of transport infrastructure, imposition of

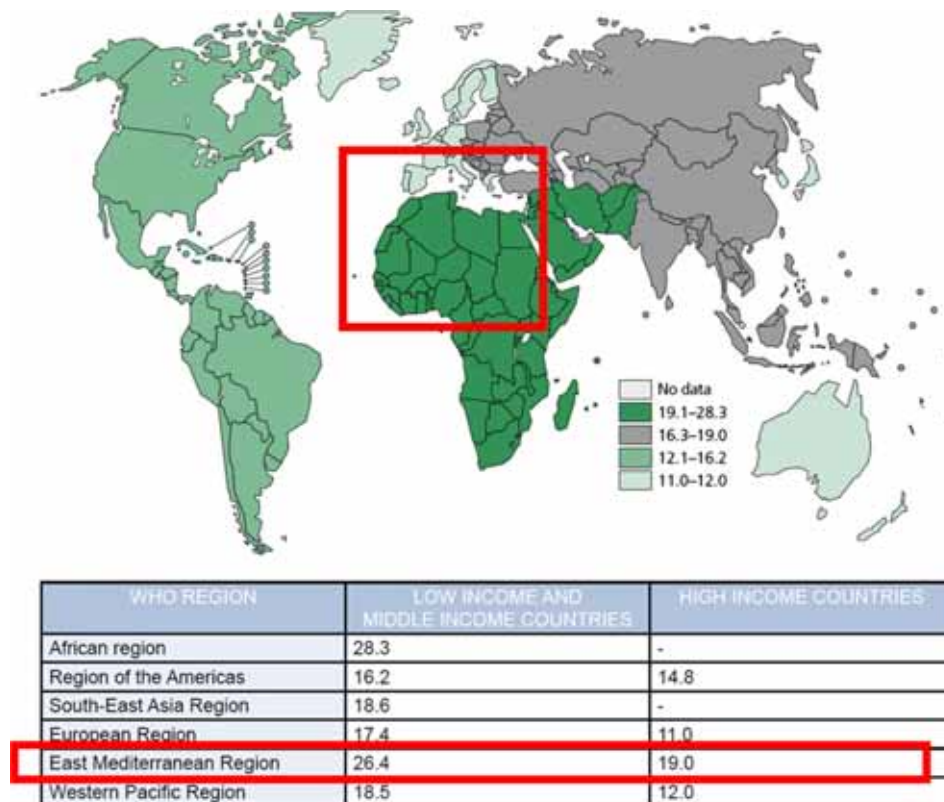


Figure 1: Road traffic mortality rates (per 100,000 population), 2002. *Source:* World Health Organization (WHO), 2007.

tariffs or taxes on cars, application of varied road tolls, discouragement of the use of private vehicles and a concomitant improvement of the public transport systems, and improvement of vehicle maintenance or replacement of old vehicles. Technological measures include introduction of less carbon alternative fuels or compressed natural gas vehicles, introduction of vehicle emission standards, fuel economy standards, and switching from diesel to electric traction on railways” [6].

For instance, Morocco is the first African country to exclusively offer low sulphur fuels (50 parts per million [ppm] or less); it has implemented the cleaner fuels program through undertaking refinery upgrade (e.g. lead free gasoline), promoting cleaner vehicles and setting up vehicles’ emissions testing centers [7]. “Tunisia has formally announced the phase out of leaded fuel and the adoption of new sulphur level standards for gasoline, in conformity with European standards” [7].

The “Partnership for Clean Fuels and Vehicles” initiative along with UNEP [7] undertook a study to determine sulphur levels in diesel fuel worldwide; Fig. 2 can be used to compare the Arab region’s sulphur levels with other European and American countries. “Egypt has an interesting experience in taking back end-of-life taxis and providing new taxis with low installments, low fuel consumption, and low emissions, thus contributing to enhancing the air quality in Cairo” [7]. As to other Arab countries, most have switched from leaded to unleaded fuel usage; Table 1 represents a matrix developed by the “Partnership for Clean Fuels and Vehicles” to compare the status of lead phase-out as of April 2010. Each country in the Arab region has its own import, inspection, and maintenance standards for vehicles and fleets.

Table 2 summarizes the current fleet size and the main standards and policies currently adopted in these countries.

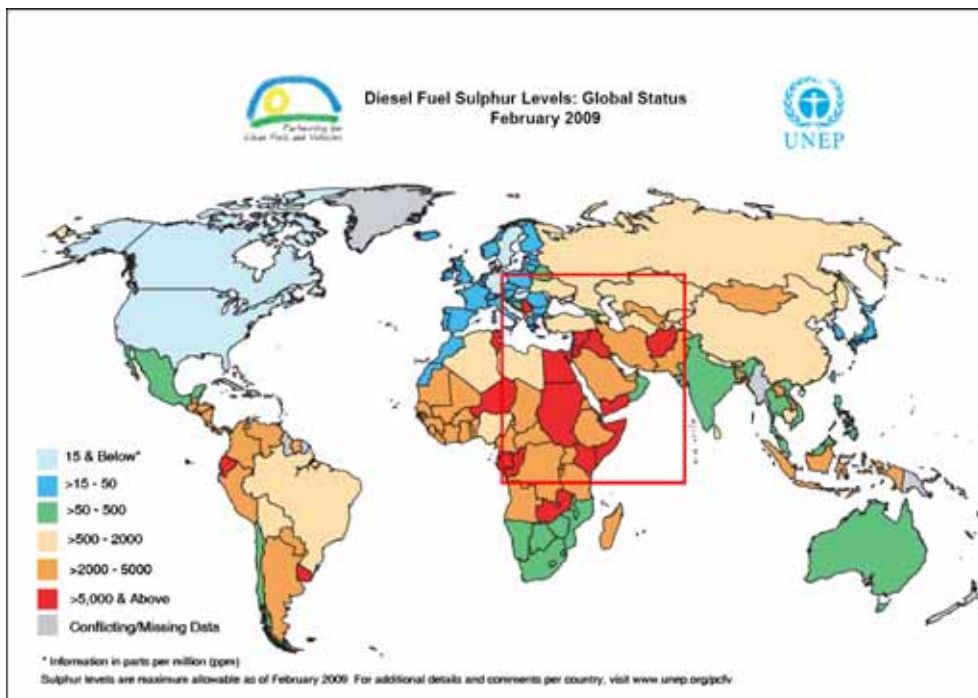


Figure 2: Global status for diesel fuel sulphur levels. *Source:* United Nations Environment Programme (UNEP), 2010.

Table 1: Lead matrix in the Arab countries.

Country	Current status			Comment
	Leaded only	Unleaded only	Dual system	
Algeria			✓	-
Bahrain		✓		-
Egypt			✓	90% unleaded
Iraq			✓	-
Jordan		✓		-
Kuwait		✓		-
Lebanon		✓		-
Libya		✓		-
Morocco		✓		-
Oman		✓		-
Palestine		✓		-
Qatar		✓		-
Saudi Arabia		✓		-
Syria		✓		-
Tunisia		✓		-
United Arab Emirates		✓		-
Yemen			✓	10% unleaded
Total	0	13	4	

2.3 Arab investments in the transport sector

The transport sector in the Middle East region is witnessing growing interest by private investors and a simultaneous approval of many governments to facilitate the private sector's participation. Countries, such as Jordan, amended laws aiming at facilitating private investment in the transport sector. In the Kingdom of Saudi Arabia, current investments include construction of bridges, aircraft leasing, port and container hub developments, and road and expressway upgrades [8]. "GCC and local investors signed, in recent years, partnership agreements with the Egyptian Government for developing the transport infrastructure such as setting up tourism railway lines connecting different touristic areas in Egypt" [9]. "In Iraq, the transport sector, which suffered in recent years, is now viewed as potential for investment. Government officials are 'eager to involve private investors' due to limited budgets, in the revamping of different infrastructure in various areas that consists of 22 airports, sea and river ports, roads, and 2,400 km railway network" [10].

2.4 Projected demand for transport services and supply

In the next 20 years, transport infrastructure operators will be facing rising demand, constrained funds, and bottlenecks in supply and demand, which challenges both public and private sectors to identify ways of cooperation to address transport problems through regulatory and incentive measures, such as toll roads and congestion pricing. "It is estimated that more than US\$ 41 trillion will be needed for infrastructure development and maintenance by 2030; thus, infrastructure

Table 2: Summary of the fleet size and main inspection/maintenance standards and related policies currently adopted in the Arab region for vehicles and fleets.

Country	Import*	Fleet (motor vehicles/1000 people)	Standards & I/M	Comment
Algeria	Imported second-hand vehicles must be less than 3 years old	112 (World Bank, 2008)	Indication of roadworthiness inspection system, no indication if it includes emissions	State-owned trucks make up about 80% of the vehicle fleet; since 1980s there has been a policy for development of the LPG vehicle sector
Bahrain	No import restrictions found	509 (World Bank, 2008)	UN report indicates there are emissions control regulations, no details about this	Has ongoing air quality monitoring program, and UN report indicates there are air quality standards
Egypt	All imported vehicles must be equipped with a catalytic converter; imported second-hand vehicles must be 3 years old	43 (World Bank, 2008)	Vehicle inspection system, including emission testing; I/M program for transit buses; Euro2 standards were meant to be effect from January 2002, but fuel specs were incompatible-sulphur too high (PCFV document)	According to USAID report, Egypt plans to integrate emission inspections, safety inspections, and vehicle registration in "one-stop" government facilities
Iraq	No information found	50 (Wikipedia)	New traffic code established in 2004 requires vehicle inspections, with stations to be located at traffic police stations	
Jordan	Imported second-hand vehicles must be less than 5 years old	146 (World Bank, 2008)	Indication of roadworthiness inspection system, no indication if it includes emissions (UN ESCWA report)	Study on Amman air quality: www.rss.gov.jo/whatsnew/2002/ve.doc

(Continued)

Table 2: Continued.

Country	Import*	Fleet (motor vehicles/1000 people)	Standards & I/M	Comment
Kuwait	Imported second-hand vehicles must be less than 5 years old	507 (World Bank, 2007)	Cars over three years old require an annual roadworthiness test that is administered by the Traffic Department; no indication if it involves emissions testing	
Lebanon	Imported second-hand vehicles must be less than 8 years old	434 (Wikipedia)	Roadworthiness inspection system established in 2004; for vehicles over two years old; inspection is annual for petrol vehicles, every six months for diesel vehicles	
Libya	No information found	291 (World Bank, 2007)		
Morocco	No import restrictions found	71 (World Bank, 2007)	Air quality program established in 2005 to check vehicle emissions – includes two stations and a mobile laboratory	
Oman	Importation of second-hand vehicle requires permission by Ministry of Commerce and Industry	225 (World Bank, 2007)	Vehicle inspection system in place, though no indication if it includes emissions testing	
Palestine	Imported second-hand vehicles must be less than 3 years old	-	No emissions standards, no indication of any vehicle testing	
Qatar	Imported second-hand vehicles must be less than 5 years old	724 (World Bank, 2007)	Roadworthiness inspection system in place; inspections are regular, no information as to time interval	

Saudi Arabia	Imported second-hand vehicles must be manufactured after 1974	336 (Wikipedia)	Indication of roadworthiness inspection system, no indication if it includes emissions
Syria	Imported second-hand vehicles must be less than 2 years old	62 (World Bank, 2008)	UN ESCWA report indicates a vehicle testing program in place, but no details
Tunisia	Imported second-hand vehicles must be less than 3 years old	114 (World Bank, 2008)	Indication of vehicle emission testing
United Arab Emirates	No import restrictions, but strict inspection upon arrival to U.A.E.	313 (World Bank, 2007)	Vehicle inspection system in place, though no indication if it includes emissions testing
Yemen	Imported second-hand vehicles must be less than 5 years old	35 (World Bank, 2007)	

*Referring to vehicle age, emissions standards, and technology requirements. *Source:* UNEP and Partnership for Clean Fuels and Vehicles, 2008. World Bank, 2011. Wikipedia, 2011.

spending has to be increased since the actual global spending comprises US\$1 trillion annually only” [11].

Zawya’s [12] analysis identifies the projected growth in Saudi Arabia in the transport sector to reach 6% to 10% annually, driven by excessive costs of new roads, railroads, and integrated community development. It is also estimated that by 2012 the transport and logistics market in the Middle East, including ground transport, air and sea freight, freight forwarding, warehousing, and supply chain management will have a total value of US\$ 27 billion. “Investments in the UAE and the GCC are opening new opportunities for the regional supply chain, logistics and freight forwarding industry. Estimates indicate that US\$ 147 billion have been committed for infrastructure developments such as road, rail and public transport in the Middle East that would drive the growth of land, air and seaborne logistics industry in the region” [13].

3 IMPLICATIONS OF CURRENT TRANSPORT POLICIES/INFRASTRUCTURE

Although, transport systems are progressing and developing in many aspects, serious gaps and negative implications do exist. The unsustainable trends in the transport sector on a global scale are made obvious by observing the rapidly growing demand for transport activity where it is predicted that “the vehicle fleet will double between 2005 and 2050” [14]. At the same time, technological improvements such as fuel-efficient vehicles and alternative power sources have not been rapid enough to offset the impacts of this growth. These trends translate directly into various costs for the economy, society and environment, as presented next.

3.1 Implications of transport policies/infrastructure on the economy

“Sustainable transport infrastructure is one of the critical success factors for a country’s or a region’s competitiveness, with the potential to accelerate economic growth and investment opportunities” [11]. According to the World Resources Institute [15], the economic cost of traffic congestion has reached over 3% of GDP in many cities; urban road accidents cost developing countries US\$ 65 billion each year; in the most heavily polluted cities, economic losses from air pollution reach 10% of GDP; and the poorest countries’ losses, due to climate change caused by non-sustainable transport, are estimated to be 5–9% of their total GDP.

The World Bank [5] indicates that an increase in population in Arab cities has induced a rapid growth in urban transport demand while improvement in the transport system and supply has not kept pace with this growth, thus creating shortage in supply levels. This shortage is causing higher levels of traffic congestion and air pollution, and inefficiency in movement of goods and people, affecting cities’ economic productivity and competitiveness. As such, higher costs, delays, and uncertainty triggered by low performing transportation infrastructure adversely affected trade which is one of the main drivers for economic activity; transportation infrastructure was not fully attuned to economic growth in many countries in the region.

Additionally, current transport infrastructure investments encourage urban sprawling, which proved to be inefficient over time. This trend restricts land use of both urban and rural areas, provokes redundant transport, and prevents proper and efficient rural and urban development.

3.2 Social implications of current transport policies/infrastructure

Despite several strategies and initiatives, the current transport policies and infrastructure development in the Arab region have negative social implications, as reported by the World Bank [5] in its

latest studies. Infrastructure development “could make a stronger contribution in general to social development by improving the access and travel of citizens, especially the poor, between urban and rural areas.

In addition, there are specific areas, namely road safety, women’s empowerment, and the accessibility of persons with reduced mobility, where the sector’s contribution could be further enhanced if there was greater understanding of issues among governments and focused interventions whenever justified. Inadequate design of urban and interurban road networks, poor quality of public transport, weak institutional and legal frameworks, incentive measures, unsatisfactory enforcement of traffic and transport regulations, and shortcomings in information and education contribute to the poor performance in these areas. Several countries in the region are signatories to the ‘Convention on the Rights of Persons with Disabilities’ but none seem to have started to implement the Convention in the transport sector” [5].

3.3 Implications of transport policies/infrastructure on environmental sustainability

“The transport sector currently consumes more than half of global liquid transport fossil fuels, emits nearly a quarter of the world’s energy-related CO₂, generates more than 80% of the air pollution in cities in developing countries, results in more than 1.27 million fatal traffic accidents per year, and produces chronic traffic congestion in many of the world’s urban areas” [16]. These costs to society, which can add up to more than 10% of a country’s GDP, are likely to grow primarily because “the global vehicle fleet is expected to increase from around 800 million up to around 2 or 3 billion in 2050” [14].

In the Arab region, the transport sector is becoming increasingly linked to economic and environmental problems. It accounts for 32% of the total energy consumption [6] and represents a major source of the greenhouse gas emissions which are the most alarming implications of current transportation policies and infrastructure development [17]. A new study on air pollution in Beirut [18] has shown that the transport sector in the city is contributing to oxides of nitrogen concentration levels much higher than the international norms, resulting in chronic pollution worse than that in EU’s major cities. “In Cairo, ambient concentrations of pollutants exceed, most of the time, World Health Organization’s (WHO) guidelines” [5]. Similar results were reported in other cities like Damascus, Dubai, Amman, and Algeria, which have negative impacts on quality of life and cities’ competitiveness and economic growth.

Besides, “the need for construction materials and the development of land-based transportation has led to deforestation and loss of biodiversity. Marine transport operations are affecting the water quality because of dredging, waste, ballast waters, and oil spills; many land and marine species are becoming extinct due to changes in their natural habitats and reduction of range land” [17].

4 POLICIES AND ENABLING CONDITIONS TO BE INTRODUCED TO GREEN THE ARAB TRANSPORT/MOBILITY SECTOR

“Greening the transport sector is part of greening economies in a more sustainable path for development. Such an endeavor involves the refitting of businesses and infrastructure so as to deliver better services and financial benefits, while using natural resources more efficiently, reducing wastes and polluting emissions, and delivering enhanced social services for all segments of the population” [19]. In this regard, “the strategy towards a green transport system should be a combination of voluntary initiatives by the private sector, incentive measures, with strict compulsory regulatory measures and targets that have to be introduced and implemented in stages” [20].

4.1 Strategies and policies

It is imperative to tackle the problems of current transport policies by reforming or replacing old ones by appropriate policies that contribute to encouraging consumers, developers, investors, and governments towards a greener and more efficient and sustainable transport system. "Several studies have clearly indicated that a green, low carbon, transport sector can reduce greenhouse gas emissions by 70% without major additional investment. Also, the reallocation of just 0.16% of global GDP in support of public transport infrastructure and efficiency improvements to road vehicles would reduce the volume of road vehicles by around one-third by 2050. It would diminish the use of fossil fuel by up to one-third and promote strong and sustainable employment in the sector" [16].

One of the most important transportation strategies that can be adopted in the Arab region is shifting to alternative modes other than private automobiles and decreasing the use of private vehicles. With car-ownership rates increasing significantly as shown in Table 2, preventive measures such as introducing road and parking fees for private car usage should be enforced especially in the Gulf region; in parallel, promoting public transport necessitates providing, reliable, efficient and environmental friendly busses, trains, and rapid transit at affordable rates, particularly for the poorer segments of the society. Raising fuel prices is regarded globally as an essential tool for increasing transport sector energy efficiency and reducing GHG emissions. Countries such as China, Russia, and Viet Nam have successfully altered from low fuel-price policy to a high fuel-price policy. As recommended by the World Bank [5], proper systems should also be established whenever feasible to compensate operators for public service obligations imposed on them in order to withstand social and economic impacts on the public due to the increase in prices. In the Arab region, the adopted pricing policies such as fuel pricing, vehicles taxation, and public transport tariffs vary greatly from one country to the other, and should be gradually adjusted while paying attention to the social impact of cost reflective price levels [5]. Some countries like Egypt and Yemen regard low prices as an element in poverty reduction or economic promotion and thus their governments continue to subsidize prices, whereas "eliminating subsidies and imposing taxes that generate revenue to finance the transport sector spurs improvements in fuel efficiency, encourages the use of alternative and cleaner fuels, and promotes less polluting forms of transport" [21].

Furthermore, local authorities should adopt the Transportation Demand Management (TDM) which incorporates various strategies such as traffic calming, flextime, congestion pricing, distance-based charges, transit improvement, rideshare promotion, pedestrian and bicycle improvements, and car-sharing or pooling that result in more efficient use of transport systems.

4.2 Measures and regulations

Right regulations represent an essential step towards a green and sustainable transport sector. "These are meant to be socially and politically acceptable rules that define and shape action and behavior" [22]. They are intended to modify behavior in order to avoid environmentally undesirable actions. International organizations do not have the authority to sanction or enforce cross-national regulations; thus, it is easier to regulate nationally rather than internationally.

In order to eliminate undesirable aspects in the Arab transport sector, measures and regulations should be imposed, which include:

- adopting fuel economy standards,
- shifting to alternative modes other than private automobiles such as public transport, walking, cycling, and electric vehicles,

- private car usage preventive measures,
- increasing vehicle occupancy levels,
- import regulations for automobile license with respect to maximum age specification for second hand vehicles, year of production and life span, energy saving, hybrid/electric,
- charging fees for the issues of car licenses based on engine capacity and fuel consumption and number of cars owned,
- taxes on vehicles with large engines, and
- charging parking fees, particularly in congested areas.

4.3 Incentives

To reinforce the above measures and regulations, some incentives shall be incorporated in the policy system as a method to encourage users to abide by the law. Local authorities should create incentives that would lead to a reduction in fuel consumption. This can be achieved by encouraging or requiring individuals and/or public and private organizations to use alternative fuels proven successful in other countries, and investing in vehicular technology [23].

Other examples of such incentives include:

- *Cost differential*, where cleaner fuels are marketed at lower prices compared to other types; this measure has proven to be very effective in many countries, including Lebanon where a price differential of around 6% increased the share of unleaded fuel in the market from 15% to 85% in less than 3 months.
- *Alternative fuel and advanced vehicle funding*, that helps private companies and non-profit organizations acquire alternative fuel and more efficient and modern vehicles.
- *Clean taxi replacement grants*, to facilitate the replacement of existing old stock of taxis with modern low emission vehicles.
- Rebates on the purchase of *cleaner vehicles*, such as natural gas or hybrid electric vehicles.
- The *clean school bus program*, that aims at reducing emissions from school bus fleets by encouraging and assisting in the purchase of clean school buses, such a program was implemented in North Central Texas.
- *Free shuttle bus services*, an effective incentive that has been proven successful in many countries in order to encourage commuters to shift from private to public transport; the service is available in countries such as U.A.E. where busses transport commuters from identified areas to places such as malls and centers, and can be developed in the rest of gulf region.
- *Improved facilities*, such as pedestrian areas and bicycle lanes to accommodate non-motorized transport.
- *Allowances on the available public transport*; for example, companies can encourage their employees use public transport systems by providing them with group discounts or season ticket allowances on the available public transport.
- *Encourage carpooling*, a successful method to decrease the number of on-road vehicles; initiatives include design of carpool lanes, provision of cash or parking vouchers for sharing on a daily basis, regular draw prizes, restricted parking lots for car sharers only, and extra annual leave and time off from work to encourage employees' carpooling.
- *Encourage the purchase of low-carbon fuel-efficient, hybrid, and all-electric vehicles* through local fees exemption, tax credits, vehicle registration charges reduction [24].
- *Encourage the retrofit of diesel vehicles* through "a reduction in vehicle registration fees, taxes,

or user fees, clean diesel awards/publicity for fleet operators who use retrofit control, and funding by government agencies” [25].

- *Encourage reuse or recycling of end-of-life vehicle materials* through financial incentives; for example, “Ford recently announced it will offer between \$1,000 and \$3,000 to consumers who turn in autos that are seven years or older for recycling and then buy a 2010 company model” [26].

4.4 Finance and investment

The United Nations Environment Program (UNEP) [27] recommended increasing financing in size and scope to adequately address the vulnerability of existing and new transport infrastructure and services. Scaling up financing for sustainable transport must be complemented with sound pricing practices. Moreover, UNEP [27] has suggested that climate change and GHG mitigation-related funds need to be acknowledged as they are instrumental in providing support for technology/knowledge transfer, capacity building, and policy development and in leveraging funding and investments by the private sector.

4.5 Private sector

The majority of countries in the Arab region have, throughout the 1990s, encouraged the participation of the private sector in the development of infrastructure facilities and services. In 1997, and according to the World Bank [5], private investment in transport-related infrastructure projects throughout the MENA (Middle East and North Africa) region has reached approximately US\$5.7 billion, but declined thereafter. Yet, the need to build additional capacity at airports and ports, and to extend and maintain road and motorway networks has continued to grow. The private sector has an important role to play in meeting this additional demand in a fiscally constrained environment. This requires a change in paradigm as, for too long, the focus has been in MENA’s transport sector on public provision of infrastructure and services.

4.6 Institutions and governance

The development of the institutional framework for a green transport sector is needed in order to reduce transport-related emissions. This requires cooperation and coordination between governments, private and public sector, and non-governmental organizations. Governments can play a key role herein while focusing on the development of regulations and coordination of national activities, introducing incentive measures, supporting cooperation among stakeholders, raising awareness among decision makers, promoting capacity building, empowering civil society and non-governmental organizations, encouraging partnerships with the private sector, and developing financial plans that sets transport on a sustainable path.

4.7 Training and public awareness

The World Bank [5] indicates that capacity building and increasing public awareness should be pursued for all stakeholders in the public sector. Many senior decision makers in many Arab countries may match the training and capability of their western counterparts but they often do not have the systems, institutions, or even the staff to formulate and implement adequate strategies and investment

plans, and to ensure that operations are organized and managed efficiently. Proper planning and asset management systems are required, especially in the road sector. Regulatory capability should be developed, notably for urban public transport services. Performance of border agencies (particularly the Customs) needs to accompany improved cross-border facilities. Better governance and accountability systems are necessary everywhere. Major training effort is needed to develop a technical capacity capable of utilizing and maintaining advanced vehicular technologies and fuel mixes.

Additionally, awareness campaigns should be initiated at national and regional levels and should include capacity building elements, such as training seminars or train-the-trainers workshops, to educate officials of the corresponding authorities in designing and implementing effective and efficient policies for a green transport sector. Similar campaigns should also be designed for vehicle owners and drivers. Parallel to introducing incentives and new regulations, transport users need to get advice on the efficiency options they can use to reduce costs. These measures should involve high interaction between domestic, regional, and international experts in order to stimulate knowledge transfer of best practice.

4.8 Education

As in the case of energy efficiency, students in the Arab region are not aware of how 'green transport-related education' is different at different universities, and have low appreciation of how these topics might be directly related to their future careers. Topics related to transport are established components of curricula in civil and environmental engineering. New topics related to greening the sector and making it more environmentally sustainable are taught by experienced lecturers within more specialized courses. Green transport concepts, like energy efficiency, are still mostly taught as part of broader content areas in the undergraduate programs, and in selected graduate courses.

5 IMPLICATIONS OF TRANSFORMATION TO A GREEN TRANSPORT SECTOR

Sustainable transport was defined by the World Business Council for Sustainable Development [3] as the ability to meet society's need to move freely, gain access, communicate, trade, and establish relationships without sacrificing other essential human or ecological values, today or in the future. Thus, greening the transport sector in the Arab region would have various positive impacts on the economy, society, and environment as described next.

5.1 Implications of green transport on the economy

Upgrading and improving sustainability of the transport sector can achieve a set of economic benefits. Efficient transport policies, such as better road, parking, and fuel pricing strategies, efficient transport planning, and better land use policies, tend to foster employment and increase income. In addition, local, regional, and international trade activities are accelerated or hindered by the quality of a well-funded and strategically planned transport in the corresponding region. Different green transport domains are in turn trade services and investment opportunities. Similarly, facilitated flow of personnel and goods across boundaries of countries translates into an economic advantage. The United Nations Economic and Social Commission for Western Asia (ESCWA) has worked since 2007 towards "the use of trade as an engine of growth" by empowering countries to implement policies for improving transport infrastructure and logistics within the framework of the ITSAM, the Integrated Transport System in the Arab Mashreq [1]. The introduction of fuel prices, while taking into consideration the social impacts, results in better choices in car models, fuel saving, and reduction in the need for car travel, thus decreasing national fuel consumption and public spending.

5.2 Social implications of a green transport sector

Sustainable transport infrastructure promotes the usage of public transport facilities and cost effective transport services and means. This enhances accessibility to markets, services, employment opportunities, and reduces poverty in communities as it creates economic opportunities for everyone regardless of the users' gender and age. Improving affordable modes for commuting such as walking, cycling, and public transportation increases overall affordability and basic accessibility. Reducing the number of vehicles a family must own can provide significant savings, which has the same effect as increasing their income. When sustainable measures are introduced and implemented in the transport sector, remote and rural areas can be connected to the transport grid, which will tend to reduce rural to urban migration, enhance community development, and improve income distribution. According to the World Bank [28], efficient transport systems and roads also facilitate access by health workers to often sparsely populated rural areas as well as the necessary monitoring and supervision of health services and initiatives. Health care services such as hospitals and clinics will not be restricted to specific areas, which will provide equal and affordable opportunities for different segments of the population, and eliminate unnecessary transport costs. Additionally, the impact of sustainable transport on girls and women, especially in rural areas, who often suffer disproportionately from poor transport, is profound. This is a reflection of the fact that better transport services help to ease the risks of travel and thus allow more opportunities for school attendance, home hygiene, and prenatal care [28].

5.3 Implications of a green transport sector on environmental sustainability

Shifting from private automobiles to alternative modes like walking, cycling, and public transport reduces road congestion and in turn decreases the number of accidents, energy use and pollutants' emissions significantly. In addition, green modes of transportation promote exercise and recreation, and improve health, which are often overlooked but have essential positive impacts specifically on productivity and human well-being. Likewise, improving traffic flow and circulation and introducing cleaner technologies for vehicles decrease congestion, reduces time lost in traffic, and enhance fuel efficiency while decreasing levels of air and noise pollution.

6 CONCLUSIONS AND RECOMMENDATIONS

The current transport sector practices in the Arab region represent major challenges on the path to green sustainable transport systems. The lack of sustainable policies and adequate incentives and the deficient cooperation and coordination between different stakeholders have to be modified and resolved in order to move toward a green transport that will have positive impacts on the economy, society, and the environment.

This paper has presented an overview of the current trends and transport practices in Arab countries, with emphasis on those imposing negative consequences. The overview was to identify transport challenges so that appropriate action can be considered and problems can be resolved. The study has indicated that decision makers in Arab countries could play a major role in promoting green transport and consequently green economy by adopting/implementing several strategies, policies, and regulations. Such desirable measures include training and public awareness, education, scaling up finance and investment for sustainable transport, development of an appropriate institutional framework and governance, in addition to providing enabling conditions to the private sector and incentives to encourage users to shift from unsustainable transport

habits to green transport ones. The effects of raising awareness among users, operators, and governments should not be underestimated. The latter can transform obligatory policies to self-initiated actions towards green transport. Although it is a hard task for governments to start with, it will help ease the process of transformation. It is crucial for decision makers to know the importance of creating awareness among all parties and establishing and implementing a proper policy system using appropriate incentives that will help Arab countries' economy and society prosper, and their environment go greener. Further research could focus on addressing the role of the green transport sector in specific Arab countries and undertake in-depth study of its impact on green economy.

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