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While seasonal bottlenecks are common in the world, Lebanon suffers from a chronic traffic problem that dates back to the 1990s, when the 15-Year Lebanese civil war finally ended. Since then, the situation has aggravated due to the deteriorating condition of the road network, the absence of a reliable public transportation system, and recently the influx of more than one million officially registered Syrian refugees escaping the war in their home country.

Economically speaking, the development of any nation remains extremely challenging and hard to achieve in the presence of a poor infrastructure and a frail road network. In fact, the cost of road congestion is estimated at \$2 billion/year (near 4% of GDP). Hence, the lack of road development and maintenance in Lebanon has definitely restrained investment and economic growth, deteriorated road safety and stretched travel times between regions. In reality, Lebanon ranked 124th in terms of quality of roads amongst 138 countries, according to the 2016-17 Competitiveness Index of the World Economic Forum.

According to the World Bank's "Roads and Employment Project" (2017), the total Lebanese road network constitutes of 21,705 km of roads. Furthermore, the World Bank estimates that the Lebanese main road network "consists of about 6,380 km of mostly paved roads classified as: (a) International Roads (529 km), (b) Primary Roads (1,673 km), (c) Secondary Roads (1,367 km), and (d) Internal Roads (2,811 km)". According to the same report, and while there is no accurate survey of road conditions as the last survey was conducted back in 2000, the Ministry of Public Works and Transport (MPWT) estimates that only 15% of roads in the main network are in good condition, while 50% are in fair condition and the remaining 35% are in poor condition...

The aggravating situation is not only related to the poor road network but also to the absence of a reliable public transportation system. Inefficiency and lack of organization characterize the current system of public transport in Lebanon. This has led to the multiplication of shared taxis, known as "service cars", and minivans. Besides the prolonged detours of "service cars" to pick up more passengers and the excessive speed and irresponsible behavior of minivans drivers, the fierce competition among drivers leads to a continuous and unpredictable stopping of vehicles which, in turn, causes additional traffic congestion and deterioration of road safety.

One of the most perceptible repercussions of the nonfunctional public transport is the reliance of most of the population on their own cars to commute. In fact, only one quarter of the population

is relying on public transportation, while around three quarters are using their private cars to commute.

As a result, road congestion is directly linked to the substantial dependency on private cars, which reached alarming levels across Lebanon. Estimates reveal that there are around 1.75 million registered vehicles in Lebanon, of which 85% are cars. As a matter of fact, the total number of registered new cars has been increasing at an average yearly rate of 13% between 2007 and 2016. Besides the considerable number of cars in the capital, Beirut witnesses the entry and exit of almost 500,000-600,000 daily vehicles from its three main arteries (Tripoli road, Damascus road, and Saida - Tyre road). This also means that there is one car for almost every 3 individuals, which is a very high ratio when compared to different countries like Turkey and China, where the ratios stand at one vehicle for every 7 persons and 12 persons, respectively.

Furthermore, the chronic situation worsened due to the rising number of Syrian refugees since 2011, which amplified traffic on an already-congested road network. The surge in traffic is estimated at 15%-20% nationally, with the average increase being higher in areas with elevated concentration of Syrian refugees. According to the World Bank, it is estimated that the influx of refugees have increased the rehabilitation and upgrade needs of the road network by about US\$50 million yearly.

One of the key solutions to alleviate road congestion in Lebanon is to create a modern and reliable public transportation system. Reducing congestion will substantially decrease imports of cars on one side, and cut health and pollution problems on the other side. This can be initiated through the provision of dedicated lanes for public transport and the prioritization of public transport at traffic signals. As a matter of fact, the "Greater Beirut Urban Transport" project is under preparation between the MPWT and the World Bank to reduce traffic at Beirut's main entrances through the Bus Rapid Transit (BRT) system. This system aims at dedicating exclusive lanes for buses with a limited number of stops that allow passengers to reach their destination faster than when in ordinary buses. In reality, BRT systems are gaining traction worldwide as they provide the same benefits of rail in terms of speed and capacity, in addition to being more cost effective. The 1st phase of the project will target the northern entrance of Beirut to Tabarja, and will provide a park-and-ride system for commuters who will buy tickets from stations rather than paying directly to the bus driver.

Reviving the pre-war railway system is another possibility, but there are numerous obstacles along the way. Talks about the possibility of rehabilitating the coastal railway line led the European Union to grant an amount of \$2 million in 2014 to study the reconstruction of the Beirut-Tripoli corridor. However, illegal construction along the old pathway and the transition into local streets makes the project harder to materialize. In addition, the capital cost of building a railway in Lebanon is almost fivefold the price of the BRT system.

Road safety management is also crucial when it comes to traffic management. While several initiatives are coming to light, investing in Intelligent Transportation System (ITS) has several benefits, among which, decreasing the probability of congestion occurrence, reducing car accidents and fatalities, and lowering fuel consumption and emissions. Smart traffic signals such as variable message signs are also a preventive measure that aims to mainly detect bottlenecks, and hence help reduce congestion at Lebanon's main roads and save drivers both time and money.

Besides the development of an efficient public transportation system, improving the quality of roads is essential. In this context, the World Bank recently allotted \$200 million to upgrade the Lebanese road network while creating job opportunities for both Lebanese residents and Syrian refugees. This Roads and Employment Project includes a US\$45 million grant from the Bank-administered Concessional Financing Facility created in 2016 to support middle-income countries that have in the past been recipients of regular Bank financing, but are currently experiencing unusual social and economic duress. On a similar note, the rehabilitation of the road network

remains of substantial importance as the demand for passenger cars will keep on rising if the status quo lingers, especially that new public transportation projects are usually medium- or long-term projects and may witness delays related to financing. This implies that the beltline project surrounding Beirut should also be implemented as it will ease through traffic substantially at the capital's three main arteries.

While most of the existing projects either rely on foreign funding or increasing fiscal spending, the participation of the Lebanese private sector can reduce the financial burdens of the public sector and provide high-quality investments. In fact, public private partnership (PPP) projects to upgrade Lebanon's transport system and its main road network tend to be more successful as they combine the expertise and resources of both the public and private sectors. In this respect, Built to Operate (BOT) is considered one of the most common practices in infrastructure projects using private funding.

Finally, improving the road network and renovating the public transportation system will not only decrease traffic in the capital but will also allow investors to widen their projects' scope to areas outside the capital. In turn, this will revitalize numerous rural regions across Lebanon and hence set the ground for stronger national economic growth and employment and, at the same time, contribute to a cleaner environment and less CO2 emissions in the medium-to long-term.

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