



Palestine Economic Policy Research Institute (MAS)

**Background paper
Roundtable session (3)**

Traffic Congestion in Palestinian Cities: Impact and Solutions

Prepared by: Dr. Samir Abu Eisheh

April 2019

1- Introduction

Traffic congestion in urban areas is a global challenge associated with serious economic, environmental, and health implications. Over the last years, a surge in traffic congestion has been experienced in Palestine, explained by the steady increase in the number of vehicles, in conjunction with poor infrastructure not adapted to adjust to this increase. Sustaining this trend is expected to exacerbate traffic congestion on the medium and long terms. Undoubtedly, curbing congestion is a significant responsibility shouldered by all relevant authorities: Palestinian municipalities, ministries, and institutional stakeholders, especially the Ministry of Transportation, the Supreme Council of Traffic, Traffic Police and operators of transport services. For curbing this problem and developing a sustainable transport system, policy interventions are needed.

This background paper aims to examine traffic congestion in Palestinian cities, investigate the reasons behind its rise, its adverse impacts, in addition to drawing short and medium-term projections. Finally, the paper which was prepared for discussion in a Roundtable session on this topical issue, concludes with several questions for discussion among participants of the roundtable. This paper and the debate aim to identify needed policy recommendations that would contribute to curbing congestion.

2- Numbers of Vehicles and Projected Increase

In Palestine, the growth rate of new vehicles, especially private ones, is higher than the rate prevailing in many other countries. During the period 1990-2015, the annual growth rate of vehicles averaged 3% worldwide. Official statistics show a discrepancy between developed countries' growth rate and that of developing countries. The former had an annual growth rate of 1.8% against 8.6% in many developing countries.¹ This discrepancy is due to higher per capita income and the tendency to follow modern lifestyles. However, the proportion of private car ownership relative to the population remains relatively low in developing countries, in comparison to developed countries.

The number of licensed vehicles in the West Bank has tripled over the last decade. By the end of 2017, there were 228,324 licensed vehicles, up from 77,584 in 2007– an annual increase of 13.9% compared with a growth rate of 9.6% in 1971. It is important to note that private vehicles make up 79.3% of the total number of vehicles licensed in 2017. The percentage of household private car ownership is around one-third in the West Bank. The percentage rises in Ramallah and Al-Bireh to around 50%. Based on official data, the annual growth rate of new vehicles registered in the West Bank was about 18% between 2007 and 2017. Table (1) below shows the number of new vehicles licensed in the West Bank annually between 2007 and 2017.

Table (1): Number of New Vehicles Licensed in the West Bank Annually, 2007-2017 (Million USD)

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Number	7,699	10,112	15,796	20,083	17,032	13,672	12,426	16,071	19,602	26,371	32,920

Source: Annual Statistical Report 2017, Ministry of Transport.

¹ Abu-Eisheh, et al., Strategic Planning for Sustainable Transportation in Developing Countries: The Role of Vehicles, Accepted to be presented at the 15th World Conference on Transport research, Mumbai, May 2019

This increase in number of vehicles (new and second-hand) was spurred by the promotion of consumer spending (through lower purchase taxes from 75% to 50% in 2011, flexible payment plans and credit facilities). Regardless of what was announced regarding the introduction of purchase tax cuts to incentivize upgrading the vehicles fleet, the underlying driver might have been increasing public revenues, generated from increased demand on licensing new vehicles.

Another factor explaining this increase is banks' car-credit facilities, which have tripled over the period between 2007-2017, rising from \$83.1 million to \$249.4 million, as shown in Table (2). According to statistics from the Ministry of Transport, about 7,652 or 23% of the total number of vehicles were registered for the first time and mortgaged to banks in 2017. The increase in the number of vehicles caused a significant increase in the traffic volume on the roads network, which is the actual number of vehicles observed passing a given street in a given time, especially in urban areas. Previous studies indicate that the annual average growth in traffic volumes over the past five years was 4.9% in Ramallah and Al Bireh against 4.0% in Nablus.²

Table (2): Total Number of Private Vehicles' Loans in the West Bank, 2007-2017 (Million \$)

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Value	83.1	93.0	133.4	225.8	170.0	191.4	219.8	246.3	329.4	210.4	226.4

Source: PMA records.

The steady increase in the number of vehicles in most Palestinian cities, as figures show, is alarming. The duration of traffic congestion is also expected to expand to most daytime hours and to other parts of the road networks, like internal and side roads, in addition to main arterial roads.

Under the same current conditions, the number of vehicles is expected to increase by more than half a million by 2030, assuming an exponential growth rate of vehicles. Depending on the average annual growth rate of vehicles during the last decade, the number of vehicles is expected to reach 650 thousand. In addition, traffic volumes/loads on road networks and transport utilities will possibly increase by 4% a year, whereas traffic volumes are expected to increase by 54% during the same period.

3- Reasons behind Traffic Congestion

Traffic congestion in Palestine is associated with a steady increase in the number of registered vehicles on roads compounded by limited street capacity, poor public transport systems, inadequate response to the increasing demand for transportation, inappropriate urban planning and network structures, applied procedures, and the inefficient transport and traffic management systems.

Additionally, limited financial resources put further restrictions on the implementation of projects designed for enhancing the transport sector. Moreover, the irresponsible behavior of road users, the poor enforcement of traffic laws, and weak legal actions against law violators have further exacerbated this problem. Moreover, Israeli occupation policies hamper the smooth flow of traffic and development in area "C".

² Arab Tech Jardaneh and NCD (2016) Final Traffic and Transportation Plan Report for Ramallah, Al Bireh, and Beituniya.

In the following section, each factor of these is further discussed, noting that due to data limitations, the presented data pertains to West Bank cities only.

3-1 Impact of the Israeli Occupation Policies on Traffic Congestion

For five decades now, the Israeli occupation's policies have been hampering urban expansion plans and restricting the movement of people and goods. Such measures include restricting construction in area "C", permanent and temporary closure of cities' entrances and agglomerations, and obstructing efforts to curb traffic congestion in specific areas, such as Qalandia road and the north-eastern entrance of Al-Bireh city, forcing citizens to take side roads.

3-2 Poor Public Transport System amid Growing Demand for Transportation

Expanding road networks and infrastructure needed to adapt to the massive increase in demand for transportation is an important undertaking. Therefore, crowded agglomerations resort to alternative solutions to absorb the growing numbers of road users, such as: improve perception about public transportation, especially via buses or articulated buses, and provide a special bus lane, or commuting via railways.

Despite the high demand for using public taxicabs to commute within and between Palestinian cities, demand on public buses and mass transit is weak. For example, in 2016, the average rate of using internal public transport of the Ramallah, Al-Bireh and Beituniya areas was around 14,350 commuters per day out of the 104,560 total commuters using the internal and external lines connecting these areas. Seven internal lines are connecting Ramallah, Al-Bireh, and Beituniya with other cities. Only 270 public taxicabs are operating on these lines, with no bus line. There are 98 public transport lines, whether internal or external, for taxicabs or buses in the governorate. About 1,500 public taxicabs and 200 buses (about 12% of which are large buses) operate on these lines. In Nablus, the number of daily commuters using the 12 internal city lines reaches 84,000. Around 700 mass taxicabs and 30 buses operate on these lines.³

It is noteworthy that public transportation means are wholly owned by the private sector, whether by individuals (shared service taxicabs) or bus companies and are not directly subsidized. In other words, the service operators, especially bus companies, are for-profit businesses. However, this service is usually subsidized in many countries, or wholly or partly owned by the government or local government units, as it is viewed as a kind of social service and provides disadvantaged strata of the society with the ability to access transportation.

Another driver of traffic congestion is the deficient public transport system which has induced demand on shared taxicabs. This high demand led to a surplus in the number of taxicabs in most Palestinian cities. The annual increase in the number of taxicabs in the West Bank reached 3% during the last five years, the largest being recorded in Nablus (6%). Moreover, the unlawful use of private cars for public transporting in most cities adds an additional obstacle to the enforcement of traffic laws, especially in Hebron.

³ Arab tech Jardaneh and NCD (2016) Final Traffic and Transportation Plan Report for Ramallah, Al Bireh, and Beituniya.

3-3 Inadequate and Underdeveloped Transport Infrastructure

The inadequate transport infrastructure in Palestinian cities and agglomerations is yet another underpinning factor of traffic congestion. Cities' centers and arterial roads are condensed areas with overcrowding buildings and little empty spaces. This is in addition to the limited road reserves in structural plans and the high costs of acquiring, constructing and expanding roads in urban areas.

A large part of roads capacities is used for parking vehicles, even during peak hour. Using one of the two lanes of a one-way road for parking reduces the road's capacity sometimes to less than the half. Moreover, "bottleneck" intersections have limited capacities, sharing the same space or even competing for its use, especially if they were not well-organized or had narrow spaces, like most Palestinian intersections. This also applies to intersections controlled with traffic lights.

Finally, parking spaces of public transport stations in the city centers and surrounding areas are generally limited. This confines the movement of vehicles and buses compounding traffic congestion, especially when arriving at or leaving these stations. As well, on-street parking of public transport vehicles reduces street capacities and negatively affects traffic flow.

3-4 Inappropriate Urban Plans, Network Structure, and Applicable Procedures

Structural urban plans and regulatory procedures for constructing urban cities were developed many years ago. Frontal setbacks were not at that time a prerequisite for building in crowded commercial areas, whether in city centers or along arterial roads. Although these plans were revised during the last two decades, revisions did not affect road reserves, their borders, or extensions in crowded areas. This is an indication of the limited spaces available to upgrade the roads network in many cities, which were constructed without proper planning or consideration of the future needs of expansion, as structural plans of big cities take into account.

On the other hand, the radial and linear planning models were used for planning many Palestinian cities. For example, the linear model is best suited for the mountainous topography of Nablus city, as the model allows the passage of primary traffic through linear roads. The radial model was used based on the roads network structure and direction in urban areas, like Ramallah and Al Bireh cities. Furthermore, the designing and planning of the roads network in many cities do not provide alternative routes for commuting through crowded city centers, through ring roads that assist in reducing congestion and rerouting traffic, especially those heading in the same direction.

Municipal licensing requirements for constructing large commercial, service, or residential complexes, do not request an assessment study of the impact of constructions on traffic flow. Such studies are relatively critical, especially for complexes expected to increase the traffic volume largely, so as to consider ways of mitigating that effect and estimating developers' contribution to the costs incurred in that process. In addition, some licenses are not conditional on providing parking spaces within buildings, if a fine was paid. However, instead of using these revenues in providing substitute public parking lots, they are added to the municipalities budget and spent on other expenditures. This leads to on-street parking of vehicles in the already busy roads, overcrowded small parking yards, and driving long distances to look for a parking space, which all exacerbate traffic congestion.

3-5 Limited Financial Resources

Upgrading the transport systems and roads networks depend on the availability of financial resources that municipalities secure from donors and the government. This affects their ability to plan, design, implement, and maintain public transport systems, especially if funds are delayed or stopped. Other financial resources of municipalities come from municipal fees charged in return for the administrative services they provide, excise taxes transferred by the government, project allocations in other ministries budgets, like the MoLG and the Municipal Local Development and Lending Fund (MLDLF). However, these resources are not large enough to cover all developmental expenditures of municipalities.

3-6 Poor Transport and Traffic Management Systems (TMS)

Following the establishment of the PNA, specifically between 1995 and 1999, a series of studies addressed TMS in some Palestinian cities; Ramallah and Al-Bireh, Bethlehem, Beit Jala, Beit Sahour, Gaza, Nablus, Jenin, Tulkarem, and Qalqiliya. Plans were drawn up, outlining solutions for easing traffic congestion over a five-year span. In fact, part of these plans was implemented, including rerouting traffic, installing traffic lights, controlling private parking lots, and improving the capacity of specific roads and intersections. However, the outbreak of the second Intifada in 2000 hindered the implementation of most plans for upgrading public transport.

Putting in place the appropriate TMS procedures goes in line with efforts exerted for easing traffic congestion. Shortcomings in this respect include:

1. Insufficient procedures for Traffic Management Systems (TMS) on roads and intersections.
2. Uncontrolled entry of private vehicles to city centers.
3. Unregulated urban access by commercial vans and trucks. Solutions include: providing special lanes for trucks or hours of access permitting the movement of trucks, provide parking spaces for trucks, and freight loading and unloading locations.
4. Unregulated management of demand on transport through the promotion of using common taxicabs, public transportation, pedestrian traffic, and bicycle lanes wherever possible, in addition to encouraging the application of flexible or staggered working hours systems.

Certainly, there are exceptions. In some cases, commercial vans and trucks entry to urban centers are well controlled. Also, some institutions, like Birzeit University, use staggering hours and encourage students to share transport vehicles, and some other institutions provide a mass transportation van for commuting its employees to/from work.

Successful planning of TMS in Palestinian cities depends mainly on the experience and expertise of the municipalities' cadre and engineers, responsible for planning. Generally speaking, most of the current cadre needs further training. In addition, institutional and regulatory arrangements should be put in place to facilitate that mission.

3-7 Inappropriate Behaviors of Road Users and Weak Enforcement of Traffic Laws

A large segment of road users does not abide by traffic laws, which increases traffic congestion. Traffic tickets issued by the Traffic Police doubled from 18 thousand in 2015 to around 41 thousand in 2018 in Nablus city alone ⁴. Despite the huge number of tickets, traffic movement is not fully controlled, and traffic laws enforcement is still weak, which draws attention to the inadequate capacities and personnel of the Traffic Police. Encroachments on the roads by owners of commercial shops and street vendors restrict smooth flow of vehicles and compound traffic congestion

4- Effects of Traffic Congestion

This section reviews the economic, environmental, and health repercussions of traffic congestion, mainly:

4-1 Costs of Lost Time and Wasted Fuels

Costs of traffic congestion are principally calculated based on the costs of lost time and wasted fuels. There are no official studies estimating these costs at the national level, yet, some case studies addressing specific traffic intersections could help in providing a clearer idea about the high levels these costs have reached. A study of Ras Al-Jora intersections, specifically the three intersections at the northern entrance of Hebron city, shows that around 540 thousand hours were lost in 2015. This estimate was reached depending on an estimate of the lost time for each vehicle that passed the three intersections during the study period (about 46 thousand vehicles during the day's peak hours assuming 2:15 minutes/vehicle in lost time).⁵ The cost of lost time was estimated at USD 400 thousand, based on calculating the cost of lost hour as 30% of the average wage per hour that year (USD 2.5). Regarding calculating the cost of the additional fuels needed to compensate for the wasted fuels because of traffic congestion, the study indicates that this cost results from the frequent stop -and-go movement of the vehicle. The study shows that around 1.1 million liters of fuels were wasted, equivalent to USD 1.6 million.⁶ This cost was calculated using a special program simulating traffic movement.

4-2 Environmental and Health Hazards

It is evident that traffic congestion has adverse effects on the environment. In addition to increasing noise levels, the air is polluted massively with the emission of CO₂ and other harmful chemicals contributing to global warming. Consumption of vehicles' fuels represents about 45% of the total energy consumed in Palestine. Vehicles consume a total of 624 million liters of diesel and 304 million liters of gasoline. This means that emissions of vehicles account for the largest share of energy-related CO₂ emissions (35% of total emissions equivalent to 12.6 million tons of CO₂ coefficient).⁷ The average per capita emission in Palestine remains low compared to many other countries, yet, it is expected to rise due to the steady increase in the number of vehicles. It should be noted that there is a direct correlation between the vehicle years of registration (age) and pollutants produced by fuel combustion. In this regard, about 55% of all vehicles registered in 2017 are vehicles which are 10 years of age.⁸ Regardless of the amount of emissions compared to other countries, it has undoubtedly serious health effects

⁴ Based on information from the Traffic Police head – Nablus Governorate, April 2019.

⁵ Traffic Study and Key Economic Indicators for Ras Al-Jora, Hebron, Universal Group for Engineering and Consulting, 2015.

⁶ Ibid.

⁷ Abu-Eisheh, et al., Strategic Planning for Sustainable Transportation in Developing Countries: The Role of Vehicles, Accepted to be presented at the 15th World Conference on Transport research, Mumbai, May 2019

⁸ Source: Annual Statistical Report 2017, Ministry of Transport.

on the respiratory and nervous systems. In addition, hydrocarbons and nitrogen oxides from vehicle exhausts are responsible for many lung diseases, asthma, and nausea.

5- Questions for Discussion

In conclusion, maintaining the same road networks capacities and transport utilities, or settling for limited expansions will exacerbate traffic congestion leading to further complications. Therefore, it is necessary to expeditiously work on developing mechanisms to deal with traffic congestion before it is too late.

We hope the following questions will help in drawing the needed policies:

1. What interventions are needed to upgrade the transport infrastructure and sector?
2. What interventions are needed to improve planning and implementation of road and transport systems?
3. What interventions are needed to enhance and modernize the public transport sector?
4. Is there a need for policies restricting private vehicles ownership?
5. Is it possible to enforce a high-tax policy on private vehicles to reduce their increasing numbers?
6. What interventions are needed to improve compliance with traffic laws?
7. What are the technological techniques used worldwide to enhance traffic management and reduce congestion are transferable to oPt?