The Impact of Traffic Congestion and Public Transit on Air Pollution

Dr. Khaled Sahili and Dr. Osama A. Abaza

Abstract

Highway networks play a major role in the geographical accessibility within the country and the region in general. In addition, it plays a vital role in the economic well being of communities and countries. In spite of its strategic role, it is considered the major source of pollution and a major consumer of world energy sources. In that regard, fifty percent of world energy sources are consumed by the different modes of transportation while it reaches sixty percent of total local consumption of fuel in Palestine.

This study aims at exploring the alternatives to reduce the congestion and encourage environmental awareness programs in Al-Bereh-Ramallah Governorate area. This objective is reached through the evaluation of the impact of air pollution emitted from traffic congestion, public transit, and truck traffic in Palestine. The study includes measurement of traffic count of private and transit vehicles, level of congestion in the study area, air pollution emitted as a result congestion, and the overall impact on the environment and human beings.

The study presented the background on the roadway system in Palestine on the bases of its length, classification, traffic counts, vehicles performance, intensity of roadways in terms of length per one thousand inhabitants, vehicle ownership relative to the region, average daily traffic, and level of service for the different roadway facilities. Statistics indicate a high percentage of shared-taxis (seven passenger's occupancy vehicles) in the Al-Bereh-Ramallah study area in which it reaches fifty percent of the average daily traffic.

The study presented the traffic environment in the study area, traffic control techniques, and congestion levels. Alternative solutions were presented to improve traffic and transit vehicles circulation considering the projected improvements on the environment. Advanced computer simulations and animations were used to evaluate the different presented solutions. The study area was chosen to represent a prototype for other typical locations in Al-Bereh–Ramallah area. The study area includes Al-Ersal Street to represent a typical arterial and Dawar Al-Manara area. Based on

thorough investigation of the congestion problems identified in this study, the following was suggested as a solution:

1. Closure of part of Al-Nahda Street and create a pedestrian mall
2. Designate the parking areas within Al-Manara area
3. Reorganize the pedestrian crosswalks in Al-Manara area
4. Provide the area with the necessary signs
5. Reorganize the public transit routes and stations in the study area

It is important to note that the study focused on the short term solutions and on a micro scale prototype. Therefore, a comprehensive network analysis is an essential part of an overall solution of the metropolitan area.

Further traffic and geometrical surveys were implemented to the analysis of Al-Ersal Street using the specialized traffic simulation software CORSIM to analyze traffic flow based on specified conditions of geometry and traffic, fuel consumption, air pollutants, etc. The following cases were considered in the study:

1. Status quo (do nothing alternative)
2. Reduction and replacement of public transit vehicles (operating outside the metropolitan area) with high occupancy vehicles
3. Several scenarios of on-street parking on the arterial
4. Signal optimization and coordination on the arterial
5. Combined measures of the actions above (cases 2-4)

Each of the cases shown above (2 through 5) had its share in the improvement of the quality of traffic and environment. The combined measures case (case 5) resulted in a reduction in delay by 17%, reduction in air pollution on the arterial by 12%, and reduction in fuel consumption by 10.3%.

The study gave recommendations for adapting techniques in Traffic System Management (TSM) in the Palestinian metropolitan areas to reduce congestion and improve traffic environment, encourage the utilization of green areas in the highly populated areas, create a balance between supply and demand regarding the measures taken, review of current polices in public transit licenses, and encourage further research on the impact of traffic induced pollution. In addition, comprehensive planning strategies should be considered for the Palestinian cities in the integration of traffic induced pollutants and the requirements of sustainable development.