BATTLING CONGESTION IN MANILA: THE EDSA PROBLEM

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ABSTRACT

The urban density of Manila, the capital of the Philippines, is one the highest of the world and the rate of motorization far exceeds the street capacity to handle traffic. The setting of the city between Manila Bay to the West and Laguna de Bay to the South limits the opportunities to spread traffic from the south on many axes of circulation. Built in the 1940's, the circumferential highway EDSA, named after historian Epifanio de los Santos, seems permanently clogged by traffic, even if the newer C-5 beltway tries to provide some relief. Among the causes of EDSA perennial difficulties, one of the major factors is the concentration of major shopping malls and business districts alongside its course. A second major problem is the high number of bus terminals, particularly in the Cubao area, which provide interregional service from the capital area but add to the volume of traffic. While authorities have banned jeepneys and trisikel from using most of EDSA, this has meant that there is a concentration of these vehicles on side streets, blocking the smooth exit of cars. The current paper explores some of the policy options which may be considered to tackle congestion on EDSA

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INTRODUCTION

Manila[1] is one of the Asian megacities suffering from the many ills of excessive street traffic. In the last three decades, these cities have experienced an extraordinary increase in the number of vehicles plying their streets, while at the same time they have sprawled into adjacent areas forming vast megalopolises, with their skyline pushed upwards with the construction of many high-rises. The joint processes of globalization, outsourcing, and the relocalization of manufacturing activities have been accompanied by a rise in the purchasing powers of many people in developing Asian countries, which has allowed them to acquire motorized vehicles, motorbikes and automobiles, even if profound inequalities exist in regard to the capacity to acquire a vehicle (Cervero 2013). It has resulted in a rapidly increasing congestion of the streets, especially in cities where the urban fabric is traditionally made of narrow roads not suitable for heavy traffic. Congestion not only slows down considerably the speed of travel, and therefore diminishes the efficiency of the overall economy, but also has nefarious effects on the environment (air pollution) and public health (chronic asthma, bronchitis, eye irritation). It also is blamed for an excessive use of fossil fuels.

The paper will examine the case of Manila and the Epifanio De los Santos Avenue, or EDSA, which is the main thoroughfare of the entire metropolitan area. It will then present a number of possible scenarios to improve traffic in the Philippine capital, including rail mass transit, traffic demand management, and improvement of bus traffic.

[1] Unless it refers to the municipality of Manila, we will use the name Manila, or Metro Manila for the whole metropolitan area, made up of 17 municipalities, even if the EDSA Avenue, focus of this paper, does not run on any part of the territory of Manila stricto sensu.

Figure 1: EDSA in Quezon City, North of Cubao, southbound traffic

Photo Y. Boquet, July 23th, 2011
Congested bumper-to-bumper traffic makes travel very slow but creates some opportunities for vendors. Rail traffic can be very efficient to beat road traffic

I. MANILA, A CITY CHARACTERIZED BY VERY HIGH DENSITIES

Greater Manila is a classic case of excessive concentration of people and economic activity on the small territory of a national capital city. It accounts for 35.7% of the Philippines' economic output, 18% of its population and 28% of its motor vehicles, on barely 0.2% of the country's land area. The population density of Manila is among the highest of the major metropolitan areas in the world with a comparable land area (see table 1). It is almost twice as dense as New York City, for example, and only surpassed by Mumbai and Dhaka.

Table 1: Population Density of Selected Metropolitan Areas in The World

	Land area (sq.km)	Population (millions)	Population per square km
Mumbai (India)	603	13,830 (2011)	22.937
Dhaka (Bangladesh)	360	7,001 (2008)	19.447
Metro Manila	**639**	**11,855 (2011)**	**18.567**
Seoul City (Korea)	605	10,442 (2012)	17.259
Cairo (Egypt)	453	9,120 (2011)	17.190
Lagos (Nigeria)	999	15,320 (2010)	15.236
Jakarta (Indonesia)	740	10,920 (2011)	14.743
Tokyo 23 wards (Japan)	622	8,949 (2010)	14.390
Kolkata (India)	1026	13,216 (2001)	12.883
New York City (USA)	784	8,337 (2012)	10.640
Moscow (Russian Federation)	1080	11,472 (2011)	10.622
Tehran (Islamic Republic of Iran)	730	8,244 (2011)	10.328
Delhi (India)	1484	12,566 (2011)	8468
Singapore	690	5,184 (2011)	7513
São Paulo (Brazil)	1523	11,244 (2010)	7383

	Land area (sq.km)	Population (millions)	Population per square km
Hong Kong, China	1104	7,072 (2011)	6405
Mexico City (Mexico)	1485	8,851 (2010)	5960
London (UK)	1572	8,173 (2012)	5206
Berlin (Germany)	892	3,544 (2012)	3974

Source: websites of the different metropolitan areas

Many parts of Manila experience heavy traffic congestion, especially in areas of high population density (more than 70,000 people / sq. km in Tondo) and narrow streets in old neighborhoods such as Quiapo (Manila) or Guadalupe (Makati). In these areas, street vending encroaches on the limited road space, further slowing down an already busy vehicular traffic, largely made of jeepneys and trisikel. Heavy downpours during the rainy season, from June to November, make some low-lying streets often impassable, due to widespread flooding, a major topic of concern in the Manila metropolitan area. Its root causes are many (Bankoff, 2003, Zoleta-Nantes, 2009, Alcazaren, 2013a), both physical (monsoon rains, typhoons, low altitude, sea-level rise) and human (urban sprawl and hard surfacing reducing the water absorption capacity of soils, slow sinking of alluvial soils under the weight of city structures, deforestation in the hills around Manila, role of squatter settlements and garbage disposal impeding the normal flow of rivers). Flooding adds to traffic woes in many parts of the Manila area.

A major component of the quality of traffic is the availability of road space. In this regard, Manila is also one of the cities most likely to be congested, since the density both of roads per square kilometer and roads per resident appears very low in Manila, compared to other metropolitan areas (see table 2). There are simply not enough roads to allow for smooth traffic. The provision of roads per square kilometer in 1980 was quite low in Asian cities, before the rapid rise of motorization rates. This issue cannot be solved quickly, unless there is drastic redesign of the whole urban fabric, which only China has attempted on a large scale. Data in table 2 do not indicate the width of the streets, the design of street patterns, and the presence of traffic lights or stop signs, which may substantially alter the speed of circulation flows.

Table 2: Road Density of Selected World Cities in 1980

	Road density (km/km^2)		Road density per person (in meters)
Tokyo (Japan)	19.87	Sydney (Australia)	6.20
Copenhagen (Denmark)	13.07	Chicago (USA)	5.00
Seoul (Korea)	12.95	New York City (USA)	4.70
Sydney (Australia)	10.91	Los Angeles (USA)	4.50
Frankfurt (Germany)	10.80	Copenhagen (Denmark)	4.30
London (UK)	10.70	Frankfurt (Germany)	2.00
New York City (USA)	9.31	Tokyo (Japan)	1.90
Los Angeles (USA)	9.00	London (UK)	1.90
Chicago (USA)	8.75	Singapore	1.00
Singapore	8.32	Paris (France)	0.90
Hong Kong, China	6.75	Seoul (Korea)	0.70
Jakarta (Indonesia)	5.46	Jakarta (Indonesia)	0.46
Guangzhou (China)	4.94	Bangkok (Thailand)	0.38
Manila (Philippines)	**4.62**	**Manila (Philippines)**	**0.38**
Paris (France)	4.35	Guangzhou (China)	0.25
Bangkok (Thailand)	3.47	Hong Kong, China	0.23

Source: Ingram & Liu 1997

In Metropolitan Manila, according to MMDA data (Vergel de Dios, n.d.), there are currently 5034 kilometers of roads (37 km of tolled expressways, 992 km of “national roads”, 2366 km of “local

roads" and 1639 km of "private/ subdivision roads"). In 2008, Manila counted 1.7 million registered motor vehicles, of which almost 10% (163,000) were registered for-hire vehicles: buses, jeepneys and trisikel.

II. EDSA, A THOROUGHFARE ESSENTIAL FOR METRO MANILA

Epifanio De los Santos Avenue was built in 1939-1940 under the presidency of Manuel Quezon as part of a grand scheme of road organization in greater Manila. Envisioned as an elegant parkway, it was to be a link between the new city of Quezon City, created in 1939[2] to be the capital of the Commonwealth of the Philippines, and the Manila airport established in Makati in 1937.[3] This "North and South Circumferential Road" was renamed 'Highway 54" in 1945 by the American occupying forces, while some Filipino lawmakers wanted to call it "19 de Junio" (birthdate of the national hero and poet Jose Rizal). The Philippine Congress finally decided in 1959 to honor a renowned multi-talented Filipino intellectual, Epifanio De los Santos y Cristobal (1871-1928). The long name being a mouthful to pronounce, the road quickly came to be known as EDSA.

EDSA serves as a major connector between the Northern and Southern part of the metropolitan area, as well as South Luzon to North Luzon in general, due to the geographical setting of the metropolitan area between the water bodies of Manila Bay to the West and Laguna de Bay to the Southeast (mountains prevent any major transportation activity on the eastern side of central Luzon). It runs for 24 kilometers from Caloocan, in the Northern part of the metropolitan area, starting at the Andres Bonifacio Monument ("Monumento") to Pasay in the South, ending on a traffic circle adjacent to the famous SM Mall of Asia shopping complex. It arcs in a semi-circle through the Eastern part of the metropolitan area, crossing also parts of Quezon City (Balintawak, Kamuning, Cubao), San Juan, Mandaluyong (Ortigas) and Makati (Guadalupe, Buendia, Ayala). It is an essential component of the spatial structuration of the Manila metropolitan area. Its powerful role in shaping the geography of activities within the metropolitan area is apparent with the location of the shopping malls, car dealerships, business centers, hotels, government agencies and provincial bus terminals alongside this axis of circulation.

On most of its length, the EDSA is a controlled-access highway, 3 to 5 lanes wide in each direction with few at-grade crossings: an urban freeway, built mostly at street level, unlike the Shanghai or Tokyo freeways. In a few spots, vehicular traffic crosses EDSA either underground (Boni-Pioneer tunnel in Mandaluyong, Quezon Avenue in Quezon City) or above it (Skyway in southern Makati, Shaw Boulevard in Mandaluyong). A major cloverleaf interchange marks the connection between North Luzon expressway and EDSA at the Quezon City / Caloocan border and a very intricate interchange exists at Magallanes with the South Luzon Expressway. In parts of Makati, EDSA is located in a trench below the level of regular street pattern, which makes it quite vulnerable to flooding in the Magallanes section.

In other places, EDSA is elevated to cross transversal roads (Ortigas Avenue Flyover in Mandaluyong, Santolan Road in Quezon City). But EDSA has some at-grade crossings with other major roads: Taft Avenue Rotunda (Pasay), Katipunan Avenue, Aurora Boulevard in Cubao, Kamias Rd and Kamuning Rd, East and South Avenues, North and West Avenues, Roosevelt and Congressional Avenues (Quezon City), and also at Monumento in Caloocan (Rizal Ave and McArthur Highway). This impairs the smooth flow of traffic. In different parts of EDSA, vehicles use left side U-Turns on EDSA: right turn into EDSA, followed by a change of lanes from the outside to the inside lines, to reach a U-turn spot, then more change of lanes back to the outside lanes and finally a right turn exit out of EDSA. It is inefficient, accident-prone and complicates traffic, even more when the U-turning vehicle is a bus.

A number of pedestrian overpasses have been built, some (15) associated with rail transit stations, some just to cross the avenue (9). In other words, there are 24 safe crossing points for pedestrians for a 24 km long highway: just one per kilometer. At-grade crossings are discouraged but not impossible, at the pedestrian's own risk.

[2] Merger of several small towns: Diliman (site of the University of the Philippines), San Francisco del Monte, Novaliches and Balintawak… Quezon City was officially the capital of the Philippines from 1948 to 1976, when the site of power was reverted to Manila.

[3] After the 1948 transfer of the airport to its current site in Pasay and Parañaque, the Makati airport runways were later used for two major intersecting streets of that city : Paseo de Roxas and Ayala Avenue.

Figure 2: Footbridge over EDSA in Balintawak, Quezon City

Photo Y. Boquet, December 4th, 2012

Traffic is usually lighter than in the central section of EDSA, but the width of the avenue and the risk for crossing pedestrians justifies the construction of this bridge, which is not accessible to people with disabilities.

On the right-of-way of EDSA, between 1997 and 2000 the Philippine authorities built a rail-transit line, the MRT (Metropolitan Rapid Transit), mostly running above the middle of EDSA, but sometimes running parallel to it. An extension of the LRT 1 line (Light Rail Transit) from Monumento to Roosevelt covers the northern section of EDSA. MRT and LRT rails between Roosevelt and North Avenue are linked, but there is no service between the two end stations, forcing commuters to walk or use road public transport. In Cubao (Quezon City), LRT-2, the East-West line, crosses the MRT, but the uneasy connection (stations apart by about 500 meters) also takes passengers back into the streets. It is a little easier in Pasay, at the Taft Avenue end of MRT for the connection with LRT 1 (EDSA station), where an elaborate network of pedestrian overpasses have been built, comparable to what exists in Quiapo between the Recto (LRT 2) and Doroteo Jose (LRT 1) stations.

III. VEHICULAR TRAFFIC ON EDSA

The excellent accessibility of EDSA sites has clearly attracted a lot of commercial investment and strategic implantation. But this abundance of shopping centers, office plazas, and places of employment generates at the same time an enormous amount of traffic on EDSA. According to MMDA data, about 350.000 people use the EDSA roadway everyday (156.000 vehicles, with a density of 565 vehicles/kilometer. Buses, provincial and local, represent a large part of the traffic on EDSA, and are often blamed for the traffic woes. The most common problems are: too many transport providers, unreliable service, and irregular and/or unpredictable frequency. Route coverage is poor, because buses concentrate on few corridors while neglecting other parts of the city. This results in low profitability, leading to poor quality vehicles, a poor safety performance, exaggerated pollution and mediocre consideration for passengers (Vergel de Dios n.d.).

City buses run on 254 routes, operated by 165 bus companies, some with a rather large fleet (Santrans 150 buses on 8 different routes, Pascual Liner 153 buses on 2 routes, RRCG 163 buses on 5 routes), some of them very many small companies (California Bus Lines 3 vehicles, Valdez Quirino only 1 bus). On the most competitive routes (see table 3), more than 10 bus companies (and up to 20) are fighting for passengers, including in traffic, where buses position themselves to block other buses

from moving forward, in a wild concert of horns barely covering the voices of "konduktors" calling for passengers "Alabang! Alabang!". 171 routes (67%) are run using part of EDSA.

Figure 3: EDSA in Mandaluyong, from the Boni Avenue Station Overpass

Photo Y. Boquet, May 29th, 2013

Buses fighting for passengers. The red roof bus swerves to the right to stop in front of the white roof bus, forcing the yellow bus to move to the left, into the path of an incoming taxi. This scene is repeated in many sections of EDSA and is a major contributor to slow traffic, as well as more potential accidents, which aggravates the traffic situation even more.

Table 3: Busiest Bus Routes within Metro Manila

Main route (South to North)	Main road used	Competing bus companies
Alabang (Muntinlupa) - Novaliches (Quezon City)	SLX, EDSA	9 (395 buses)
Alabang (Muntinlupa) - Plaza Lawton (Manila)	SLX	14 (343 buses)
Baclaran (Pasay) - SM Fairview (Quezon City)	EDSA, Quezon Avenue	17 (330 buses)
Santa Cruz (Manila) - Sapang Palay (S. Jose del Monte, Bulacan)	Quirino Hwy	10 (328 buses)
Alabang (Muntinlupa) - SM Fairview (Quezon City)	SLX, EDSA, Quezon Avenue	15 (328 buses)
NAIA Airport (Pasay) - SM Fairview (Quezon City)	EDSA, Quezon Avenue	15 (301 buses)
Baclaran (Pasay) - Navotas	EDSA	14 (288 buses)
Baclaran (Pasay) - SM Fairview (Quezon City)	EDSA, Quezon Avenue	20 (254 buses)

Source: http://ncr.dole.gov.ph/fndr/mis/files/BUS%20COMPANIES-BUS%20ROUTES(1).pdf

7736, or about 60 percent, of the 13,067 registered buses plying Metro Manila roads are provincial buses, linking the Manila metropolitan area with regions across the Philippines. Even if other parts of Manila have bus terminals (Gil Puyat LRT 1 in Pasay, Sampaloc near Quiapo : LRT1/LRT 2 junction), most companies have established their terminals alongside EDSA, with major concentrations in Pasay (Saulog, Philtranco, Victory Liner, DLTB, Silverstar, Alfonso Liner..), and in the Cubao-Kamuning stretch (Superlines, Santrans, HM Transit, Baliwag Transit, Dominion Bus, De la Rosa Liner, Dagupan Bus, JAC Liner, JAM Transit, Victory Liner, Philtranco, DLTB, Daet Express, Lucena Bus, Florida Bus, Genesis, Five Star …).

Figure 4: Private Bus Company Terminals alongside EDSA in Cubao, Quezon City viewed from the MRT train

Photo Y. Boquet, June 21st, 2013

The section of EDSA between the Cubao and Kamuning stations of the MRT lines has the highest density of bus terminals of the entire metropolitan area. Superlines buses serve distant provinces in the Bicol region of Southeast Luzon, while Five Star buses serve mostly provinces North of Manila in central Luzon (Pampanga, Tarlac, Pangasinan). On this Northbound stretch of EDSA, Southbound buses share the roadway with northbound traffic before they can U-turn to go the right direction.

Figure 5: Pasay Rotunda, near the Southwestern end of EDSA

Photo Y. Boquet, June 16th, 2013

Jeepneys can use this section of EDSA, since there is no MRT going towards SM Mall of Asia further West (beyond the background of this picture). Many jeep passengers are transferring to/from two metro lines (MRT Taft Avenue station, end of the line, and LRT 1 EDSA station). Vendors are encroaching on the roadway, jeepneys jostle for position using 4 of the 6 lanes of traffic, and passengers have to find their way in traffic, even with children in their arms. This leaves little space for taxis, individual cars and buses.

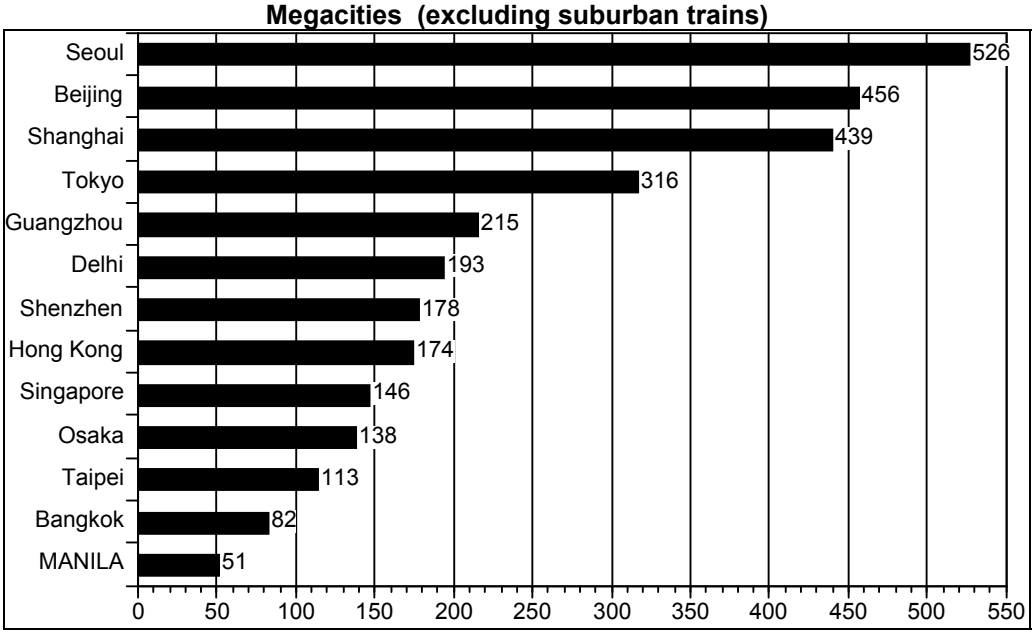
IV. SEARCHING FOR SOLUTIONS TO EASE MANILA'S CONGESTION

What could be the solutions to solve Manila's traffic problems, particularly alongside EDSA, which appears clearly as the major circulation problem in the Manila region? Answers to traffic problems have been looked about in many cities around the world, and in Asia in particular (Cervero 1998, Ieda 2010, Suzuki & al. 2013). Based on these experiences, some major possible policy options can be suggested.

5.1 Rail transit

Over the last two or three decades, many cities in Asia have developed impressive heavy rail transit systems designed to increase the share of rail in the commuter transportation mix. Manila has done timid efforts in that regard (see figure 6 and table 4), with only three lines at this time, the smallest network of any major Asian city, except for Mumbai and Jakarta, which have no metrorail transit at this time, even though they have suburban trains. The Philippines has only a tiny rail network limited to Luzon island. In terms in ridership, Manila's three lines carry only 1.1 million passengers per day, much less than in comparable sized cities in other Asian countries. Manila metro ridership is barely above Munich in Germany, a much smaller city.

Figure 6: Length (in kilometers) of Metropolitan Rail Transit Networks in Selected Asian Megacities (excluding suburban trains)



The 1999 start of MRT alongside EDSA has increased the overall passenger-carrying capacity of the EDSA corridor. It serves about half a million users every day. But it has been criticized for the limited size of the trains and their relatively low frequency. Passengers at rush hour are packed beyond the limits of comfort, and often must wait for the next train or even the third or fourth train before they can finally board. A higher frequency of trains and an increase in their length would be beneficial. It is possible since the trains are made of 3 sets of rail cars, and platforms can easily accommodate a fourth one. The policy, enforced by guards controlling the stations' platforms, of reserving one of the sets of railcars for women and elderly people leads to relatively low passenger load in the women's section, and in contrast an excessive density of people in the two other sections.

Trains on the MRT, as well as the LRT1, are clearly undersized, both in length and width. However, the LRT 2 line is a pleasant experience, with much wider trains offering a feeling of space and a relatively low passenger load. It feels much more like a heavy rail transit system than the MRT 3 and LRT 1. If technically feasible, the adoption of LRT2 rolling stock for the two other lines would offer a welcome reprieve.

Table 4: Characteristics of Manila Urban Rail Transit Compared to Other Asian Megacities

	Opening date	Length (kilometers)	Lines (stations)	Average daily ridership	Passengers / km / day	Passengers / station / day
Seoul	1974	526	19 (411)	6.9 millions/day	13,100	16,800
Beijing	1971	456	17 (227)	7.6 millions/day	16,700	33,500
Shanghai	1995	439	12 (288)	6.7 millions/day	15,300	23,300
Tokyo	1927	316	13 (285)	8.6 millions/day	27,200	30,200
Guangzhou	1997	215	8 (144)	5.6 millions/day	26,000	38,900
Delhi	2002	193	6 (145)	2.3 millions/day	11,900	15,900
Shenzhen	2004	178	5 (137)	2.4 millions/day	13,500	17,500

	Opening date	Length (kilometers)	Lines (stations)	Average daily ridership	Passengers / km / day	Passengers / station / day
Hong Kong	1979	174	10 (82)	4.2 millions/day	24,100	51,200
Singapore	1987	146	4 (89)	2.4 millions/day	16,400	27,000
Osaka	1933	138	8 (125)	2.3 millions/day	16,700	18,400
Taipei	1996	113	10 (102)	1.8 million/day	15,900	17,600
Bangkok	1999	82	7 (57)	0.9 million / day	10,700	15,200
Manila	1984	51	3 (45)	1.1 million/day	22,000	24,900

Source: compiled from the websites of metropolitan transit authorities

Stations also appear undersized, compared to those in other large Asian cities. They do not allow for very long trains and usually have only one exit, unlike, for example, Chinese metro systems with multiple exits. Access to LRT 1 and MRT 3 stations is often difficult. They are located above ground with many steps to climb, while vendors and begging children use some of the steps. Existing elevators in some stations are crowded. There are only 3 or 4 ticket vending booths per station. Security controls slow down the access to platforms, while the card reading machines, both at entrance and exit, often malfunction. The overall experience may be unpleasant, even if the LRT and MRT offer fast transportation at low cost.

An expansion of the rail transit system in Manila is needed. While routes of future new lines have been drawn for a long time (Razon 1998), financing for construction has not been secured. There are also issues with land ownership along the planned routes, and with clearing the right-of-way where ground-level rail track already exists, since it is often colonized by squatters. Reducing the crowds on EDSA-MRT trains would require a huge effort to develop alternate routes. At the present time, the choice for most people is to either endure overcrowded trains or suffer traffic jams in EDSA-plying buses.

5.2 Addressing supply constraints and managing demand

One obvious temptation is to allocate more space to vehicles and therefore reduce congestion. This policy would have two sides. The first one would involve developing new infrastructure. The second one would limit the number of vehicles authorized at any time.

Developing new road infrastructure means investing heavily in state-of-the-art overpasses and urban elevated roads, in the Shanghai mode. Where should these roads be built? Since EDSA is the major metropolitan-wide traffic problem, should it be widened? The heavy building of shopping malls and office towers alongside its route makes it difficult, considering that EDSA for most of its length is already a very large roadway, almost a freeway in some sections. Should a super-EDSA, above the current one, be built? There are logistical problems in some area such as Cubao where the LRT 2 already passes above the MRT which is itself above the EDSA roadway. In an metropolitan area potentially prone to major earthquakes, would it be wise to make thousand of cars “fly” 20 or 30 meters above ground? There is also the classic dilemma of building for more cars which allows smoother traffic, for a while until the new road space fills and the whole process of widening must be started again.

Reducing the number of cars on the road has been attempted with a vehicular license scheme which bans on certain days vehicles with certain license plate ending numbers. It is very easy to go around this restriction. Some have suggested to use the vehicle type as the base for restrictions: no Toyotas on Mondays, no Hondas on Tuesday… Is it feasible? Toyota is largely dominant. A Toyota ban on some days would create huge uproar. Would it also apply to ubiquitous Toyota taxicabs?

Linking the restriction to the level of polluting by these vehicles may not be effective in Manila, since most private cars are fairly new Japanese or Korean models with good pollution performances, while the biggest contributors to vehicular pollution are jeepneys and tricycles, as well as buses. A better coordination of traffic lights, with timing adjusted to traffic density, would be a beneficial measure to insure a smoother flow of traffic and therefore less air pollution.

Should access be linked to the number of passengers, following the example of United States HOV (high occupancy vehicle) lanes? In a societal and economic context closer to the Philippines, Jakarta has implemented a system limiting access to its Central Business District (CBD) to cars carrying at least 3 people. It may be more difficult to implement in Manila since the CBD is in multiple locations. It would have really an impact if all cities with major CBDs (Makati, Mandaluyong, Taguig, Quezon City) were to act together, under the umbrella of MMDA. Car-pooling should be encouraged and rewarded, possibly with free parking in business centers.

A recent measure bans trucks from EDSA during daylight hours. But trucks are not the problem; they represent a very small portion of EDSA traffic. However, the question of trucks is more intense near Manila's port. In the last two decades, some port activities have been transferred out of Manila harbor towards Subic Bay and Batangas, about 100 kilometers away from North and South Manila, respectively. Manila's harbor is very close to the oldest part of town and the high densities of Tondo. Decongesting the port activity would limit the traffic of trucks in the metropolitan areas close to it and contribute to improvement in local traffic.

5.3 Bus policies

Jakarta has decided to go the South American way by developing a BRT system. Could a BRT system be implemented in Manila, especially on EDSA?[4] Since most major bus routes use EDSA it may be possible to run it the same way as in Guangzhou, China, where bus, both public and private, enter and exit the BRT corridor. It could be done at a minimal cost by reserving some sections of the existing road to buses, doing in fact a "BRT light", the same way Paris has implemented bus lanes where cars are not allowed. This could be attempted quickly before a more complete BRT system can be implemented. Financing for a small make-over of EDSA could be obtained by charging a special tax on users, to be used exclusively for improvements on bus transit. However, the very essence of the BRT model, as created in Curitiba and followed elsewhere, is to operate the bus vehicles in a metrorail mode, with controlled access stations, clearly separated right-of-way and payment of bus in station and not on board the buses.

At the current time, Philippine authorities have decided to attack directly the bus problem on EDSA with two complementary measures, aimed at providing more fluidity in bus transit. The first one is to try to put some order in the way people embark and disembark from local buses. In December 2012, a "bus segregation scheme", divided buses in three groups, A (Edsa-Alabang), B (Edsa-Baclaran) and C (others). Alternate bus stops have been erected alongside EDSA: "A" buses can only pick up/drop-off passengers in "A" designated stops (colored red), while "B" buses stop B stops (blue color). "C" buses may use both "A" and "B". The hope is to limit the number of sudden stops of buses and the jockeying into position of rival buses. The A, B or C sign is prominently displayed in the front of the bus.

The second measure, which will take effect on July 15th, 2013 and possibly revolutionize the transportation sytem of Manila and the whole Philippines, is to remove all provincial buses from EDSA by creating integrated terminals on the outskirts of the metropolitan area, where provincial buses will stop and transfer passengers to metropolitan transportation. The scheme is inspired by what has been done in the Republic of Korea (Seoul's Gangnam district), as well as in Indonesia (Surabaya's Purabaya/Bungurasih integrated bus terminal). The first integrated terminal will serve the provinces of Batangas and Cavite, to the Southwest of Manila. "Coastal" is located near Unionwide Mall, between Mall of Asia and Manila's airport. It will remove all Batangas or Cavite-bound buses from EDSA, therefore starting to reduce the bus-caused congestion. Buses from the LRT1 and MRT end stations and bus routes leading to "Coastal" will allow transfer between local transportation and provincial buses, also possible in Alabang in Muntinlupa, for years a major ending/starting point for local bus

[4] Other possible routes for BRT in Manila include the North-South Roxas Boulevard , Quezon Avenue and Commonwealth Avenue in Quezon City, which are both wide enough, long enough and used enough to justify BRT.

lines and a popular transfer point. Two mixed-use terminals (transportation, offices, shopping) are planned for other routes.

Figure 7: Transferring Provincial Buses Traffic Out of EDSA: The Integrated Bus Terminal

On the former Food Terminal site in Taguig, for buses going Southeast of Manila towards Laguna and Quezon provinces and the Bicol region of South Luzon, a new complex named “Arca South” is built by Ayala Land Inc., a major real estate developer. This group will also be the lead planner and manager of the northern integrated terminal, in Quezon City, next to Trinoma and SM North Mall, close also to the planned Quezon City CBD. “Vertis North” will serve all bus routes going North, towards the peri-metropolitan provinces of Bulacan and Pampanga and all points in northern Luzon.

Integrated bus terminals already exist in Philippines provincial cities, often at their edge – Mabalacat-Dau near Angeles City (Pampanga) and Lucena (Quezon),–, but the task at hand is much bigger for the megacity of Manila. When all is implemented, probably in 2016, there should be no more provincial buses on EDSA. This is expected to change the habits of people, who are used to hopping on the first bus passing by on EDSA. Under the Korean-inspired integrated bus terminal system, tickets with designated seat numbers will be issued to passengers (De La Cruz 2012). This is to ensure orderly boarding and some safety for passengers, since the identity of fellow travelers will be traceable in case of theft on board the buses. It may also end the practice of buses traveling with many extra passengers standing in the aisles, with no concern to their safety. Departures and arrival of buses will be synchronized, with a hoped-for 10 minute turnaround time of buses, as achieved in Seoul.

There is strong resistance from the bus companies to change their traditional ways of operation, but a corresponding decisiveness from the chairman of MMDA and the transportation minister of the Philippines, pushed to act by the growing impatience of the public about traffic jams. However, a number of unresolved issues remain, including the aggressive style of driving of bus conductors, oversupply of local buses running half-empty, and poor emission standards for buses. Many bus companies are controlled by well-connected personalities, politicians, military officers, showbiz or sports celebrities, who have the political clout to resist attempts to rationalize the supply of bus service and implement strict norms for buses. The same resistance is seen from the many small operators of jeepneys and tricycle, who are politically powerful as a rich source of votes. Political will is necessary to implement measures aimed at taking out of circulation aging and polluting vehicles to reduce vehicular traffic, both on EDSA and on local roads.

CONCLUSION

Solving congestion on EDSA – and in the Manila metropolis as a whole – will not be quick or easy (Santiago 2012, Alcazaren 2013b). The street pattern cannot be altered in one year, and local congestion will remain. Building more roads may not be efficient on the long term. Instead, more effective policies would be to improve the rail system, with more lines, more frequent spacious trains, better connected stations.

In some parts of EDSA, intermodality appears to work quite well, with easy transfer from MRT and buses to jeepneys and trisikel; this should be replicated as much as possible in other areas. To diminish the level of pollution generated by these vehicles, strict and mandatory emissions controls and effective standards implementation to phase out non-compliant vehicles should be imposed, while keeping in mind their everyday usefulness for commuters including students (half of the trips in Greater Manila), and their job-creation potential (250,000 jobs in Metro Manila). There should be an effort towards e-jeepneys, but vehicles currently tested are much smaller than current types, 12-15 seats instead of 20 to 30. Should the jeepney, an icon of Filipino culture, disappear as a dirty and inefficient transport vehicle? If traffic is tamed, clean jeepneys could continue to play a role, as would the lowly trisikel and pedicab, serving small neighborhood streets, with much higher standards of comfort and emissions.

The effectiveness of the new policy on provincial buses will quickly become apparent if traffic volumes diminish substantially after the opening of the Coastal integrated bus terminal. But a substantial reorganization of the whole bus system should also be attempted, by encouraging bus companies to regroup into a smaller number of operators able to manage their fleets more efficiently, which would allow them to invest in a reduced fleet of clean, fuel-efficient clean vehicles, while providing good service to the traveling public. Twenty operators on one route, which share 75% of its length, and another route served by 15 other small operators does not make much sense. Three or four players on the main routes would be more than sufficient, and would allow more brand identity and differentiation. The same could be said of the myriad micro-enterprises engaged in trisikel or jeepney management. Private management of bus, jeepneys and trisikel companies (and why not companies operating all 3 types vehicles as one integrated transport system?), under public government guidelines, could become the new norm, as it is in London or Seoul. This will not require much public investment in a country strapped for funds.

Making Manila a more sustainable city will imply profound changes in the way the transportation system of the metropolitan area is managed.

Acknowledgement

The author gratefully acknowledges the support of the University of the Philippines - Diliman for a 4-month stay in Quezon City as invited professor in the Department of Geography. Special thanks to M.S. Martinez for the drawing of the map.

REFERENCES

Alcazaren, P. (2013a). 10 reasons why it floods in Manila, *The Philippine Star*, online edition, 15 June. Available from http://www.philstar.com/modern-living/2013/06/15/953965/10-reasons-why-it-floods-manila

Alcazaren, P. (2013b). 10 reasons why EDSA is the avenue of hell, *The Philippine Star*, online edition, 22 June. Available from http://www.philstar.com/modern-living/2013/06/22/956606/10-reasons-why-EDSA-avenue-hell

Bankoff, G. (2003). ConstructingVulnerability: The Historical, Natural and Social Generation of Flooding in Metropolitan Manila. *Disasters*, vol. 27, N° 3, pp. 224–238

Bergonia, T. (2011). Are Filipinos prepared for the Big One?, *The Philippine Enquirer*, online edition, 14 March. Available from http://newsinfo.inquirer.net/inquirerheadlines/nation/view/20110314-325294/Are-Filipinos-prepared-for-the-Big-One

Boquet, Y. (2009). Transports et mobilités dans les grandes villes d'Asie. In Mobilités contemporaines. In G. Fumey, and others, eds, *Approches géoculturelles des transports* G. Fumey, and others, eds. Paris : Ellipses

Cervero, R. (1998). *The Transit Metropolis: A Global Inquiry*. Washington DC, Island Press

Cervero, R. (2013). Linking Urban Transport and Land Use in Developing Countries. *Journal of Transport and Land Use*, vol. 6, n° 1, pp. 7-24

De la Cruz; K. (2012). Coming to Manila: 'Gangnam' bus terminals, *ABS-CBN News*, online edition, 31 October. Available from http://www.abs-cbnnews.com/nation/metro-manila/10/31/12/coming-manila-gangnam-bus-terminals

Ieda, H. (2010). *Sustainable Urban Transport in an Asian Context*. Springer

Ingram, G. & Liu, Z. (1997). *Motorization and the provision of roads in countries and cities*. Policy research working paper N° WPS1842, Washington, D.C.: World Bank

Jao-Grey, M. (2007) – Too many buses, too many agencies clog EDSA, *I-Report Online*, online edition, 27 December. Available from http://pcij.org/stories/2007/buses.html

Razon, E. (1998) – The Manila LRT system, *Japan Railway and Transport Review*, vol. 16, pp. 38-39

Santiago, R. (2012). Taming the traffic beast of MetroManila. *Rappler*, online Social News Network, 11 November. Available from http://www.rappler.com/thought-leaders/15854-taming-the-traffic-beast-of-metro-manila

Suzuki, H., Cervero, R. & Iuchi, K. (2013). *Transforming Cities with Transit. Transit and Land-Use Integration for Sustainable Urban Development*. Washington DC, The World Bank. Available from http://www.scribd.com/doc/119380943/Transforming-Cities-with-Transit

Vergel de Dios, A. (no date). Traffic and Transport Management for Public Transport. MMDA (Manila Metropolitan Development Authority). Available from http://www.aaphilippines.org/roadsafety/files/Traffic%20and%20Transport%20Management%20for%20Public%20Transport.pdf

Zoleta-Nantes, D. (2009). Flood Hazards in Metro Manila: Recognizing Commonalities, Differences and Courses of Action. *Social Sciences Diliman*, vol.1, N°1, pp. 60-105