Traffic in Manila: Strategies and solutions

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1. Introduction

Constant traffic congestion and road safety are some of the acute problems of the constantly growing city of Metro Manila. Current organization of the existing transportation system could be described as unproductive, unsafe and inefficient, which, in combination with the absence of sustainable principles in a vision of future development, might cause further deterioration of the existing road system following the inevitable growth of the city.

In case of Metro Manila, there is no question 'who owns the roads?'. It is obvious, that cars are the dominant figures, defining the street network design and planning. The effect of this is the present **high traffic volume** and **unfavorable environment for pedestrians** in all areas of the city. However, despite the existing car-prioritized environment, the functional properties of the system can hardly be defined as efficient: the quantity of cars exceeds the **throughput** of the roads, thus the **traffic flow** rate is extremely low. In addition to that, because of the size and density of the city, hourly traffic distribution is almost non-existent, therefore, there is a little difference between peak and nonpeak hours. **Traffic jams** are an everyday challenge, which is seemingly unavoidable, since the existing public transportation network is not efficient and cannot cope with the **travel demand** of local population.

Unfortunately, the current situation on roads is adverse not only for drivers, but also for pedestrians who suffer the most. Despite the well-known benefits of walkable neighborhoods, the present development of the city does not follow the principles of creating pedestrian friendly environment. Pedestrian lanes are misplaced or missing, sidewalks are narrow, public transportation is insufficient and unreliable, illegal on-street parking frequently blocks the roads, crosswalks are dangerous, and the absence of greenery and shade is disturbing in the conditions of tropical climate. In other words, walking is challenging in Manila and extensive changes in policies are needed in order to promote safe walkable environment and support sustainable urban growth.

The main idea of the essay is to define major traffic problems in MM and suggest simple strategies regarding improvement of the current adverse situation in order to support the ideas of sustainable city development.

2. Statistics

On a City level, Metro Manila traffic was identified as among the ten worst on earth in a global evaluation conducted by GPS-based navigation app Waze. Scores ranging from 10 (satisfying) to 1 (miserable) were assigned after examining 50 million Waze users in 32 countries and 167 major city areas. (*Figure 1*) The answers were then evaluated for the **Waze Driver Satisfaction Index**. [1](*Figure 2*)

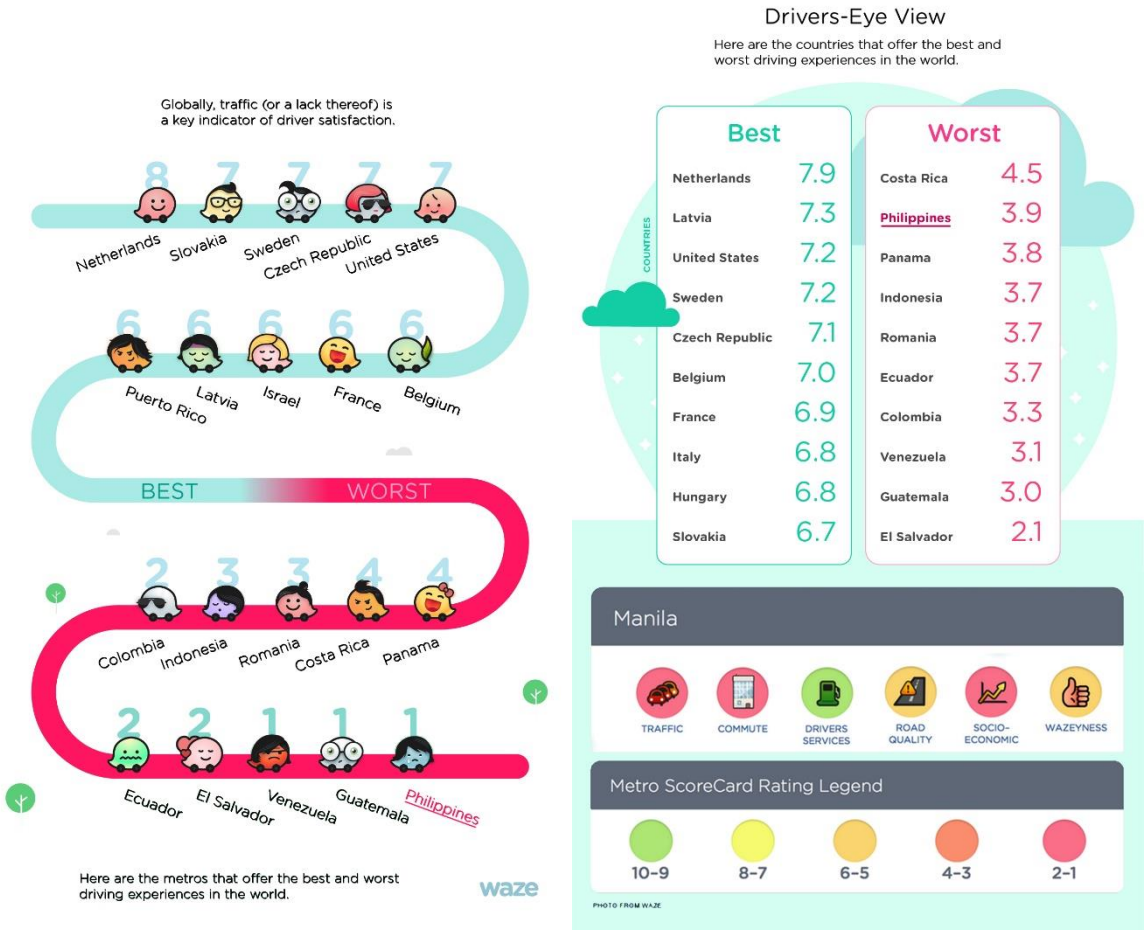

Figure 1.. **Driving Experience.** Source: Waze Mobile. https://www.waze.com/

Figure 2. **The Waze Driver Satisfaction Index.** Source: Waze Mobile. https://www.waze.com

The Waze Driver Satisfaction Index is based on six key factors: [2]

- Traffic Level estimated by frequency and severity of traffic conjestion
- Quality of road infrastructure
- Avilability of driver services such as gas stations, car services, and parking lots.

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[1] **Source:** http://cnnphilippines.com/metro/2015/10/01/Metro-Manila-Philippines-worst-traffic-longest-commute-Waze-survey.html

[2] **Source:** https://blog.waze.com/2015/09/global-driver-satisfaction-index.html

- Driver safety measured by the number of accidents and road hazards
- Socio-Economic indicator (Impact of gas prices on living, ratio of cars to population)
- "Wazeyness" - the level of helpfulness and happiness of Waze users

According to the Japan International Cooperation Agency (JICA), traffic has severely affected the Philippine economy: P2.4 billion was lost daily in 2012 due to traffic jams. JICA's 2014 study warned that starting in 2030, the **losses will increase to P6 billion a day** if nothing changes. [3] (GMA News, 2015) In addition to that, Manila also topped the chart for the longest minutes spent commuting from home to office with an average time of 45.5 minutes. (Figures 3, 4)

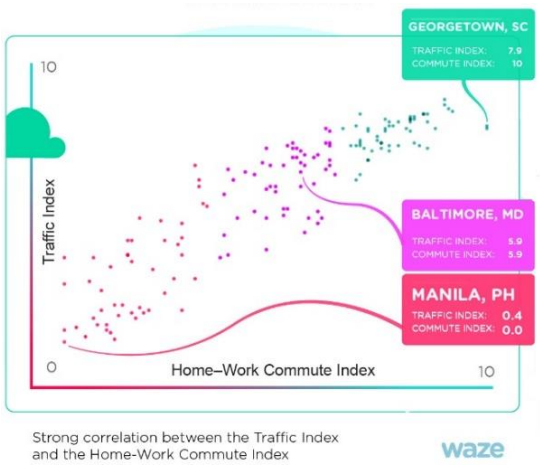

Figure 3. **Traffic and Commute indices. Correlation.** Source: Waze Mobile. https://www.waze.com

Figure 4. **Average commute time.** Source: Waze Mobile. https://www.waze.com

Summarizing the data, despite of the moderate quality of roads and good access to driver services, Manila holds the 170th position in 'Driver Satisfaction Index'[4], which indicates the strong necessity of interventions and reforms.

3. Public Transportation in Manila

According to JICA, the demand for public transit in Manila will likely reach 7.4 million passengers per day by 2030. In comparison with 1996, travel demand within MM showed an increase in number of travel by car by 15%, whereas trips by public transport declined by 7%. The high increase of car trips can be explained by higher car ownership as well as decline in car occupancy from 2.5 to 1.7 persons per car. Similar decline in vehicle occupancy has been observed in jeepneys (from 15.1 to 10) and buses (from 46.5 to 35.3 passengers). As a result, we have higher quantity of trips per person and lower vehicle occupancy which affects further deterioration of the situation on the already congested roads. (NEDA, JICA Final Report, 2014)

[3] **Source:** http://www.gmanetwork.com/news/story/535595/news/nation/phl-top-5-in-world-s-worst-traffic
[4] **Source:** https://www.waze.com/driverindex

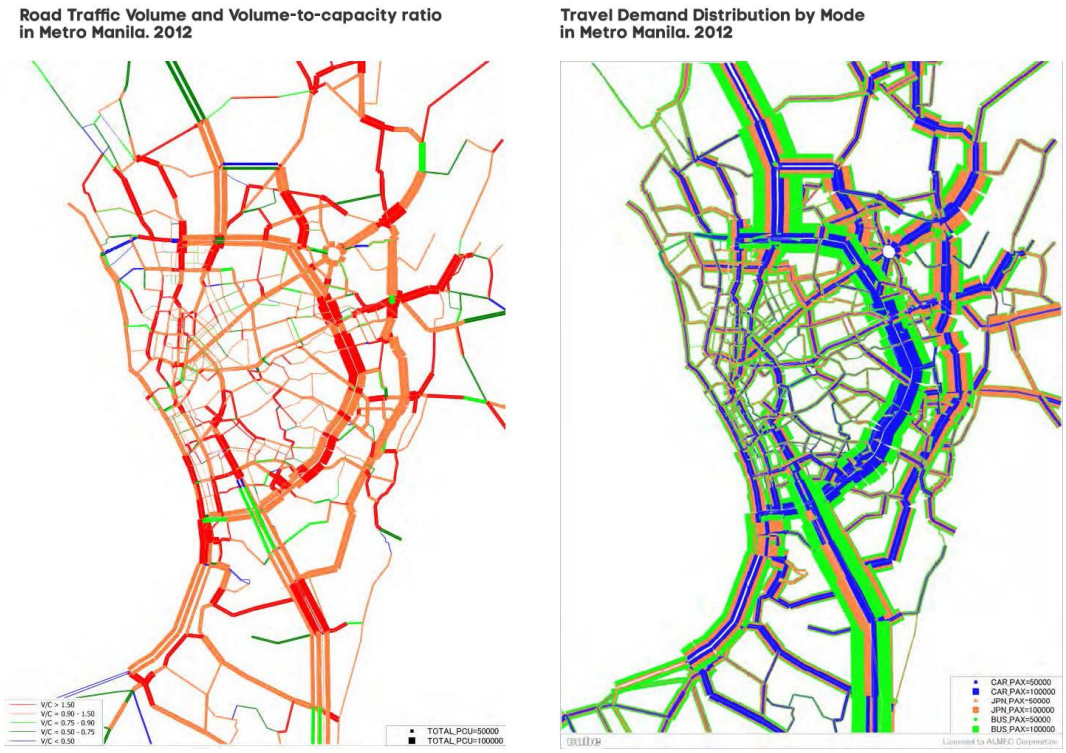

Figure 5 **Road Traffic Volume, Volume-to-capacity ratio, and Travel Demand Distribution. Manila. 2012**

The research conducted by JICA in 2012 showed, that the majority of citizens travel by jeepneys (36%) and buses (31%). Surprisingly, the car travel accounts for just 30% of travels, however, cars constitute 72% of the road traffic flow in terms of PCU-km (Passenger Car Equivalent). Summarizing the information, it is evident that the travel demand and, consequently, the number of cars are steadily increasing, and, as a result, the road network performance in the near future will be closely related to the development, improvement and expansion of the existing mass transit and endorsement of alternative transportation methods.

3.1 Forms of public transportation in Manila

3.1.1 Railways

In the end of the 19th century, the first electric powered trams, the Tranvia Network, was built in MM. At that time the population was around 300,000 people and the tranvia system was the most convenient and affordable way of commuting in regards to the populaton number. With the growth of the city, the network was expanded to a total of 85 km and covered the CBD and suburban areas. New housing estates were developed along the routes by the Tranvia developer. Tranvias served 40% of daily traffic demand together with Calesas and Carromata which provided feeder services. By mid 1940's, the war damaged Tranvias and it ceased its operation. Unfortunately, the rails themselves never recovered from the war and the Liberation of Manila in 1945. The spread of motorized vehicles prevented the tranvias from ever coming back and the railway system remained abandoned, until the development of LRT system in the mid-1970s. (NEDA, JICA Final Report, 2014)

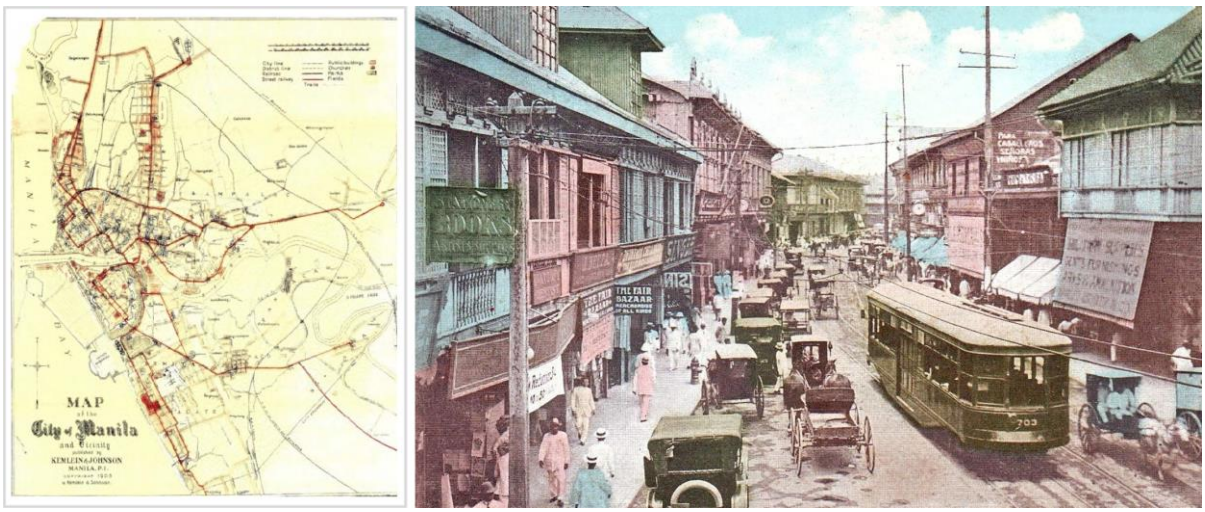

Figure 6 **Manila. 1908. Tranvia Network** *(NEDA, JICA Final Report, 2014)*

Today, railway service is primarily intra-urban. There are only 3 LRT rail lines within Metro Manila carrying more than 1 million passengers daily. The PNR South Line operated by the Philippine National Railways carries about 45 thousand passengers per day on a 28-km track. (NEDA, JICA Final Report, 2014)

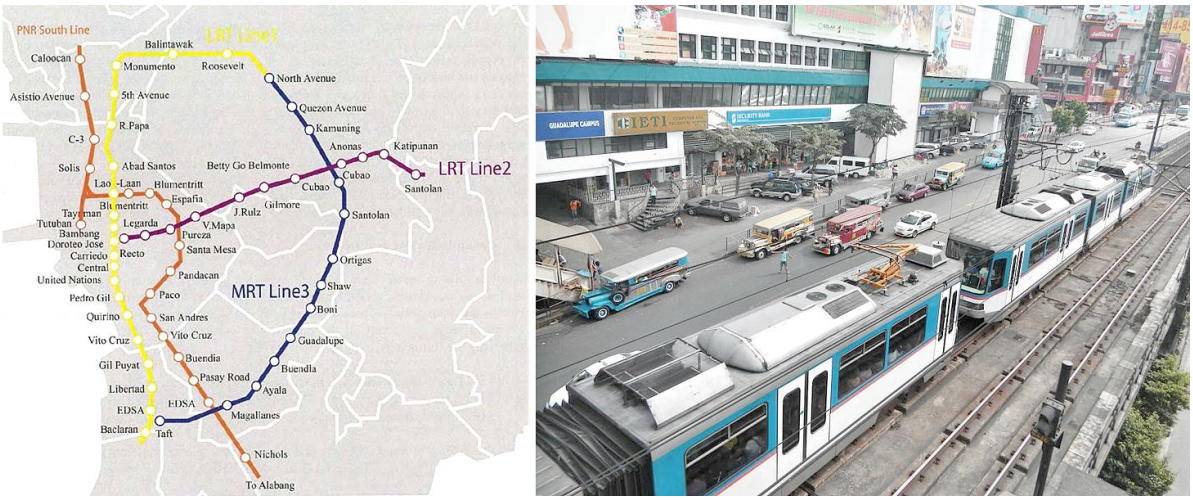

Figure 7 **Existing Rail Network in Metro Manila. Sources. Map:** High Standard Highway Network Development in the Republic of the Philippines, JICA-DPWH, 2010 (as taken from LRTA website). **Image:** https://commons.wikimedia.org/wiki/File:MRT-3_Train_Guadalupe_2.jpg

Railway System. Analysis	
Advantages	**Disadvantages**
- No traffic jams - Fast - Relatively safe - Affordable - Cover long distances	- Overcrowded - Long queues - Long waiting time - Limited accessibility - Big scale - Poor maintenance - Not enough railways to cover all areas of the city - Everyone recommends to take a cab instead

Strategies and Perspectives

In case of Manila, expansion and development of the urban rail transit network is a must. It is evident, that the existing network cannot cope with the number of users, although the travel demand remains extremely high and possible extension will likely lead into a significant decongestion of the road network. There are several plans of MRT-LRT-PNR Lines expansion formulated by the government, however, the implementation of the plans has no strict time frames because of the financial issues, and the number of newly planned railways is still inadequate for the scale of the city.

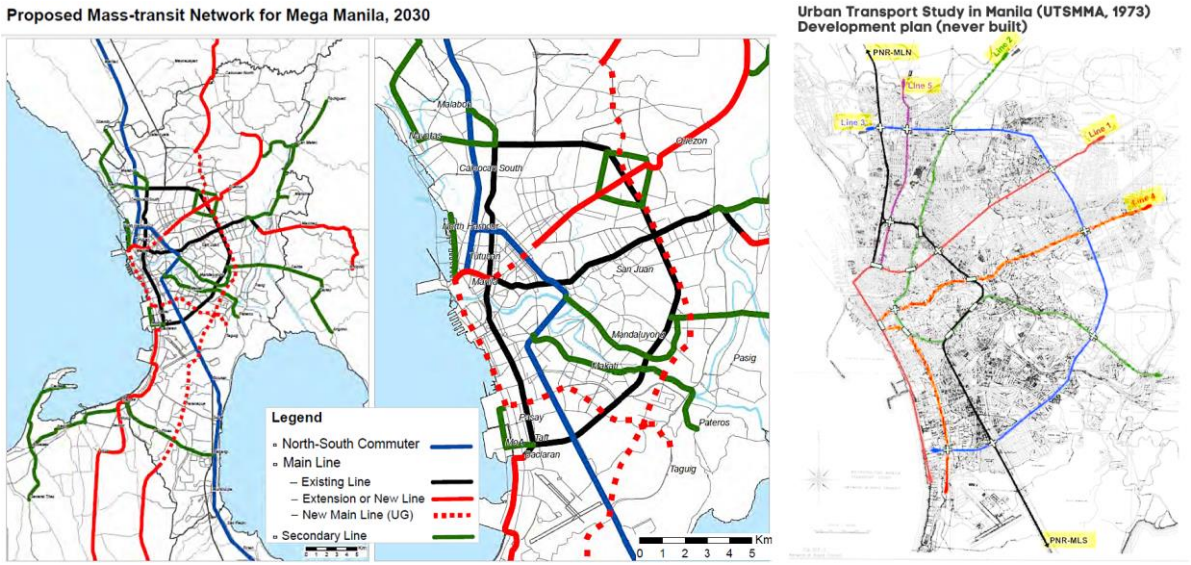

Figure 8 **New development proposal by JICA and the latest UTSMMA LRT expansion proposal** (the existence of which fully shows the inconsistent attitude of the local government towards mass transit development)

3.1.2 Buses and jeepneys

According to the statistics, today the public transportation sector relies primarily on buses and jeepneys (about 71% of all trips), which are all owned and operated by the private sector, but regulated by the Land Transportation Franchising Regulatory Board (LTFRB). Presumably, in 2030, the number of trips will decrease to 30% after the construction of new LRT lines, but the number is not certain. (NEDA, JICA Final Report, 2014) Summarising the experience of citizens, riding a bus or a jeepney is a daily struggle. The necessity of availability of an affordable, fast, and reliable bus network is enormously high. However, the current bus services are far from reaching the adequate level of quality: bus journey might take longer than 80 minutes because of the constant traffic congestion, schedule is non-existent, location of bus stops is haphazard (there are rather "loading and unloading points" than bus stops), and, if you are not a local, it is nearly impossible to find the right bus route.

Figure 9 **Metro Manila bus**. Photo credit: http://megacities-go-services.com/ . **Jeepney.** Photo credit: http://hundredyearshence.blogspot.com/2005_08_01_archive.html

Buses and jeepneys. Analysis	
Advantages	**Disadvantages**
- Affordable - Cover long and short distances - Relatively safe	- Slow - Affected by traffic - No clear schedule - No convenient bus stops - Limited accessibility - Hard to navigate the routes - Buses have fixed routes but they are not interconnected.

Strategies and Perspectives

Initially, mass transit is supposed to be a public service, but in Manila it is rather a competitive business among several private companies. Not surprisingly, this factor might be considered as the major cause of the existent disorder and dysfunction of the bus network. The government needs to step in to unify the system. To begin with, they need to develop a scheme for all the bus routes and bus stops. The routes have to be efficiently interconnected and the new bus stops should be placed at appropriate locations that will not cause too much traffic and will be convenient for passangers. Secondly, they need to adapt road infrastructure: incorporate bus lanes, place segregation barriers, improve sidewalks, place guide and warning signs, etc. Also, they need to agree on the common system of payment and rates, and to accept one clear timetable to follow. In march 2017 The World Bank has approved a $64.6-million loan to build the first bus rapid transit (BRT) system that will run between Manila and Quezon City[5]. The money will go into infrastructure development and purchase of new buses. This might be a good step to begin with, however, taking into consideration the scale of the city, it is needless to say, that further improvements of the public transport system throughout the whole city should follow.

[5] **Source:** http://business.inquirer.net/226341/1st-metro-manila-brt-gets-64-6-m-world-bank-funding

3.1.3 Tricycles.

In the year 2012, there were more than 200,000 tricycles operating in National Capital Region, accounting for nearly 67.9% of the total for-hire vehicle number. (NEDA, JICA Final Report, 2014) In Manila, tricycles provide transport services for short distance trips within and between barangays. Just like jeepneys, tricycles may be considered as a Filipino cultural icon. Carring capasity of one tricycle is 3 passengers, but it often carries more. Local government units (LGUs) are responsible for regulating and supervision of this type of public transportation. Despite of their importance as an alternative transportation method, tricycles couse lots of problems in the city. According to the report made by NEDA and JICA in 2014, tricycles and motorcycles are responsible for 45% of all volatile organic compound (VOC) emissions in MM. Apart from that, tricycles frequently worsen traffic jams and conjestion, since their fast and frequently unpredictable maneuring among traffic flows slows down the overall traffic motion. There is also an issue with safety. There are no national safety standards which might be applied to evaluate vehicle design, therefore the vast majority of tricycles have not been made with safety in mind. Tricycles are small and fragile in comparison with other vehicles and more vulnerable to collision than a passenger car.

Figure 10 **Tricycles on the streets of Manila** Photo credit: http://ffemagazine.com/filipino-icon-tricycle-pedicab/

Tricycles and pedicabs. Analysis	
Advantages	**Disadvantages**
- Cheap - Cover short distance routes - "Point-to-point" transit - "Human factor"	- Cover only short distance routes - Unsafe - Driver and passengers breathe contaminated air - Get stuck in traffic - "Human factor"

Strategies and Perspectives

In 2011 the Asian Development Bank (ADB) in collaboration with the Philippine government, started a pilot project of development of electric tricycles. In September 2014, the first **E-Trikebayan** was launched in the city of Mandaluyong. It is estimated, that a future replacement of conventional tricycles to electric ones might save millions on fuel import and

will significantly reduce CO2 emissions. [6] The design of the E-Trikebayan is also refined, which would allow to carry more passengers and offer more protection in case of collision with other vehicles.

Figure 11 **E-Trikebayan Source:** GMA News

Furthermore, the ideal solution to solve congestion and security issues might be incorporation of **separate lanes for tricycles** into design of roads. This step would improve organisation of traffic, decrease number of accidents and improve efficiency of the overall road system.

4. Incorporating bicycle networks into road design

Anyone who has ever been in Manila knows that cycling is the last way of transportation you can voluntarily choose to get to the point of your final destination. All the space on the roads is occupied by cars and the only way to get through the sea of metal is to maneuver your bike next to the fast mowing flows of big heavy vehicles, inhailing severely contaminated air and constantly risking your life. However, despite of the absence of bike friendly environment, it is evident, that most of the streets of MM have a potential for developing highly efficient infrastructure for cyclists, if there is willingness of local government to support adaplation and transformation of the existing road network.

Fortunately for authorities, the process of development of Bike Movement in MM has already started and, thanks to social media and other online resourses, planners can get enouth information to begin the design process effectively. While traffic is getting more and more unmanageble, people, despite of all the challenges, choose to cycle. They form communities on facebook such as "**Bike To Work Pilipinas**"[7], "**Bike Parking Spots in Metro Manila**"[8],

[6] **GMA News, Source**: http://www.gmanetwork.com/news/story/381395/scitech/technology/electric-tricycles-debut-on-mandaluyong-streets

[7] **"Bike To Work Pilipinas" Social group**: https://www.facebook.com/groups/biketoworkpilipinas/
"Bike To Work Pilipinas": https://www.facebook.com/biketoworkpilipinas/

[8] **"Bike Parking Spots in MM":** https://www.facebook.com/bikeparkingspotsinmetromanila

"**We Want Bike Lanes in RP Movement**"[9] and many others, in which they share their experience, demands and 'survival tips'.

"Bike To Work Pilipinas" Facebook Group
Agitative poster

"Bike To Work Pilipinas" Facebook Group
Photo of the participants

"We Want Bike Lanes in RP Movement" Facebook Group
Public Demands

Figure 12 **Bike movement on social media.**

Furthermore, people use online resources such as "Bikemap"[10] to map the cycling routes they prefer to use. The system provides an opportunity to rank, evaluate and calculate the routes users create, which makes it extremely easy to track popular destinations and directions. The app was initially created for sharing bike city tours, but, eventually, it has evolved into a multi-purpose platform with a big network of active users sharing their cycling experiences.

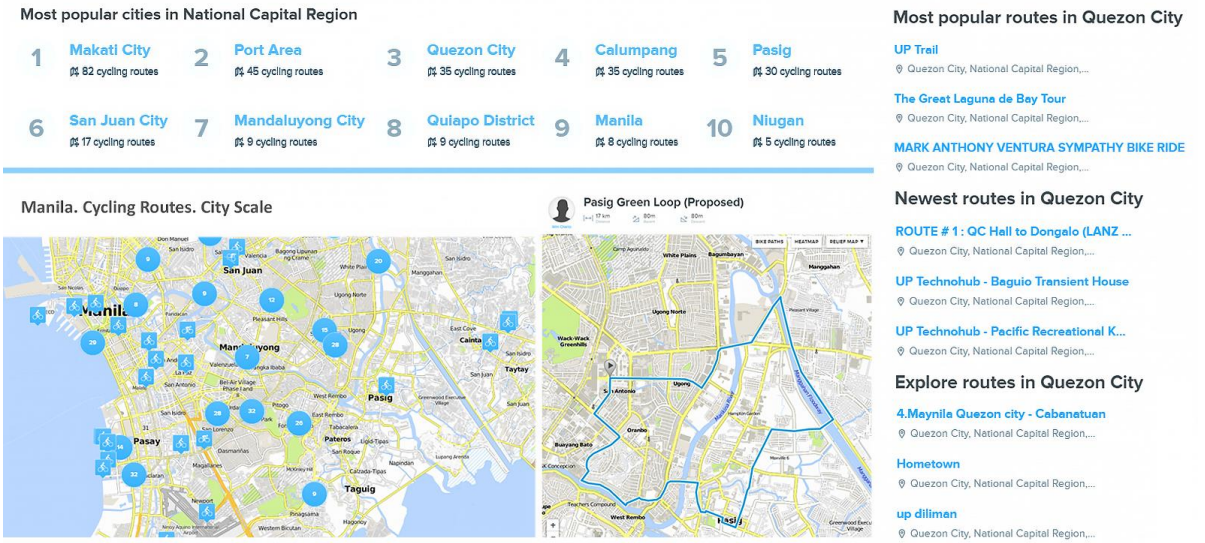

Figure 13 **Manila Data. City scale and Local routes. Sourse:** https://www.bikemap.net/

All the data taken from web resources might be used by architects, planners and local authorities in making desisions regarding **location of new bike lanes**. The citizens have already become active members of participatory planning process and the main objective for now is to analyze the data they provided and implement changes based on the feedback.

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9 **"We Want Bike Lanes in RP Movement":** https://www.facebook.com/Bike.Lanes.Now.Movement.Philippines/

10 **"Bikemap":** https://www.bikemap.net/en/regional/Philippines/National+Capital+Region/

One of the best solution to start work with is the incorporation of **Separated Bike Lanes** into the design of motorways. According to (Goodman D., 2015), "a separated bike lane is an exclusive facility for bicyclists that is located within or directly adjacent to the roadway and that is *physically separated* from motor vehicle traffic with vertical elements'. In comparison with other bicycle facility types, separated bike lane is an ideal proposal for Metro Manila, since it can help to create secure and connected bicycle networks even on the first stages of construction.

Figure 14 **Separated Bike Lanes compared to other bicycle facility types.** (Goodman D., 2015)

4.1 Possible Design Configurations:

Figure 15 **Various configurations of separated bike lanes** (MassDOT, 2015)

4.2 Forms of Separation

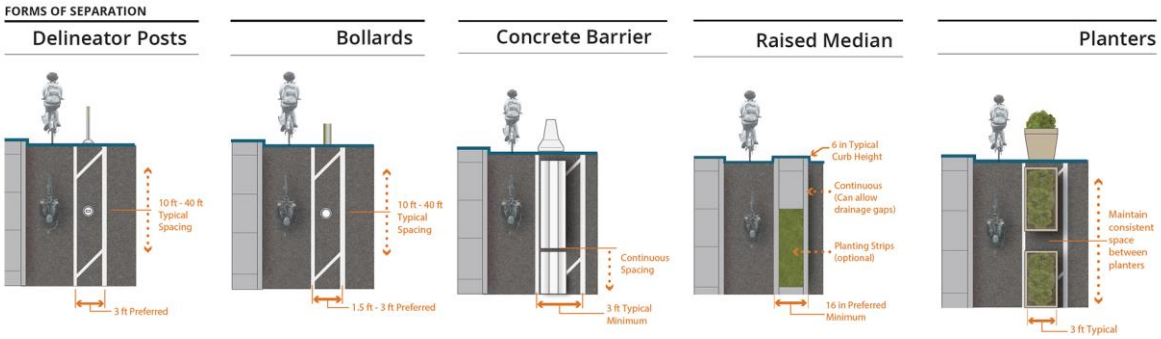

Figure 16 **Forms of Separation.** Vertical elements in the buffer area are critical to separated bike lane design. These separation types provide the comfort and safety that make separated bike lanes attractive facilities. (Goodman D., 2015)

Concluding, apart from decreasing pressure on roads, development of bike movement would lead to other positive changes such as: overall reduction of fuel consumption, improvement of air quality (less CO2, CO, NOx emissions, solid particles, etc.), environmental and public health benefits, and lowering the level of street congestion. In addition to that, the decision to support the minority group of cyclists willing to be heard (There has already been an attempt to write a petition to the president Duterte regarding

changes in legislation[11]) might also be politically important, since it shows respect towards notions of social inclusion and community rights.

5. Road safety and Speed Management

Speeding is defined as exceeding posted speed limits or driving too fast for the existing conditions. This is a behavior that some drivers engage in without recognizing the risks or seriously considering the consequences. According to the US National Highway Traffic Safety Administration (NHTSA), the consequences of excessive speed include the following: (Bagdade J., Nabors D. 2012)

- Greater potential for loss of vehicle control, which may result in a crash.
- Reduced effectiveness of occupant protection equipment.
- Increased stopping distance after the driver perceives a danger.
- Increased degree of crash severity leading to more fatalities and disabling injuries.
- Increased fuel consumption and cost.

In Metro Manila an introduction of Speed Management Program is an acute necessity, since, despite of the all existing speed limits and other precautions, drivers do not follow the rules and the simple act of crossing a road has become as dangerous as to play russian roulette. Even if you cross 2 line road on a crosswalk with traffic lights you are playing with death. According to *Speed Concepts: Informational Guide,* there are several solutions which might be included into **geometric design of roads** on the first stages of planning in order to reduce speed and increase road safety. However, in case of Manila, speed management of the already existing roads seems like a more important issue to address. The current set of techniques might be employed to reduce vehicle speed:

5.1 Speed Reduction Mechanisms

Figure 17 **Speed hamp, Speed Table, Chicane** (NACTO, 2013)

[11] **Petition to the president Duterte**: https://www.change.org/p/president-aquino-after-3-years-we-appeal-for-priority-approval-of-life-saving-bicycle-legislation-from-senators-villar-santiago-marcos-cayetano

Figure 18 **Roundabout, Raised intersection, Speed Cushion** (NACTO, 2013)

It is important to remember that specific traffic calming measures planned for application at a particular spot should correspond with the unique conditions of the location, since not every speed calming technique is appropriate for every roadway. In addition, including such measures can result in drivers slowing at the speed calming feature, and speeding between them. (Eric T. Donnell, Scott C. Hines, 2009)

6. Sidewalks

iIn accordance to *Urban Street Design Guide*, "Sidewalks play an important role in city life. As conduits for pedestrian movement and access, they enhance connectivity and promote walking. As public spaces, sidewalks serve as the front steps to the city, activating streets socially and economically. Safe, accessible, and well-maintained sidewalks are a fundamental and necessary investment for cities, and have been found to enhance general public health and maximize social capital. Just as roadway expansions and improvements have historically enhanced travel for motorists, superior sidewalk design can encourage walking by making it more attractive." (NACTO, 2013)

Figure 19 **Singapore**, which is considered one of the most walkable cities in Asia, might serve as a good example of transformation of street layout. Photo credits: http://danielainitaly.blogspot.se, http://www.sugoidays.com.

In Manila there is an absolute absence of organized infrastructure for pedestrians in most parts of the city. In fact, pedestrians comprise a majority of the population in MM, however, because of the absence of concern regarding the rights of community and stubborn efforts of local government to support development of car-centric urban environment, the interests of Manila citizens have been marginalized and neglected. In support of social justice, planners

must shift the priorities and give pedestrians the same privileges as to motorists. Sidewalks should be wide and clean, sun and rain protection devices have to be placed along the streets, on-street parking should be regulated, the system of waste management has to be introduced etc. Practically, a lot of work needs to be done before citizens can fully appreciate the idea of walking in Manila, but, apart from promoting the most sustainable way of transportation, the improvement of the street environment might also encourage people to walk as a form of exercise and recreation, which would improve quality of life and overall perception of visual image of the city.

7. The Role of Architects

Close cooperation between architects and engineers is crucially important for successful formulation of plans that will ensure well-organized sustainable extension of transportation networks in cities as their populations grow. Urban design is an interdisciplinary sector and the role of architects is to find an appropriate solution, which would comprise the interactions of the different aspects of urban life with a vision regarding future project development into a physical equivalent.

8. Conclusion

In a worst case scenario, traffic situation in Metro Manila will only evolve from bad to catastrofic with total number of trips rising to 22.5 million per day by the year 2030. Without Interventions, the capital will be losing billions of pesos daily only because of traffic jams, the roads will be completely suffocated by cars, and the natural environment, which is under a serious threat even now, will become almost non-existent within the city borders.

The existing conditions are so bad, that there is no chance the average citizens would want to leave their cars at home and turn to mass transit or bicycles. The activists who do so are either too poor to afford a car, or too desperate - because the amount of time they spend in traffic jams is far beyond reasonable. It is a well known fact, that car users can only be convinced to shift to public transport if it proves to be more efficient, fast and comfortable than using private vehicle. Hence, the only solution is not the construction of more highways, but the development of more efficient mass transportation system, and massive improvement of road infrastructure, which would promote walking and cycling.

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