Manual Bicycle Counts – Lessons from the June Bike Count Project in Four Metro Manila Cities[1]

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Abstract: In transportation and street design, "what gets counted, counts." This paper describes the June Bike Count Project organized by the Mobility Awards in select cities in Metro Manila. The project is an annual bicycle count effort by citizens and advocates together with local government units. The June Bike Count is a manual short-duration volunteer-driven initiative that addresses the lack of bike count data in the country. This is relevant with the national surveys by the Social Weather Stations from May 2020 to May 2021 showing there are more bicycle owners compared to car owners. This is consistent with the earlier study made by the Japan International Cooperation Agency that showed that only 11% of Filipino households own a private vehicle. Cycling is transportation and deserves to be prioritized and invested on by the government. Data is essential in making these investments to build quality cycling infrastructure that in turn will encourage more people to shift to cycling as mobility. Moreover, the June Bike Count is an initial attempt to adopt a standardized manual bike count methodology; a call to action for institutionalizing active transport data collection by the government; and a community building exercise that communicates the importance of transport cycling.

Keywords: Active Transport, Cycling, Bike Count, Bike Data

1. INTRODUCTION

The Philippines have established conventions of data collection that capture movements of motorized vehicles on the road. e.g., number of trips generated, or number of motor vehicles according to varied sizes and wheels. However, this has yet to be instituted for other modes of transport, especially non-motorized transport (NMT). (Mobility Awards, 2021)

Non-motorized modes have no such consistent, uniform data collection and analysis system. (Alta Planning, 2009). The Metro Manila Development Authority (MMDA) and select local government units (LGUs) implement bike count activities but are limited in scope and are not

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part of its organizational programming.

The lack of data on active transport[2] has made it difficult for citizens and advocates to demand from government to design and build cycling infrastructures, justify funding, and put value to the socio-economic benefits of active transport to the country.

In recognition of this lack of bicycle data, the convenors of the Mobility Awards, namely the Institute for Climate and Sustainable Cities (ICSC), The Climate Reality Project – Philippines, 350 Pilipinas and urban mobility advocacy groups such as MNL Moves, and the Pinay Bike Commuter Community implemented the June Bike Count Project (JBCP).

The June Bike Count Project is a citizen-led collaborative capacity-sharing effort that aims to mobilize volunteers to count people on bicycles. The project's objective is to help government, businesses, and citizens obtain baseline figures of bicycle traffic to advocate for better bike infrastructures such as network of bike lanes and end-of-trip facilities. As a capacity-sharing effort, the JBCP mobilized and trained volunteers on bike count. This pilot was implemented in partnership with Metro Manila city governments of Pasig, San Juan, Marikina, and Quezon City.

The objectives of this paper are as follows:

a. Present on data collected in relation to designing and implementing manual short-duration bicycle counts;
b. Discuss how such data can be used to understand the needs and preferences of people making trips on bicycles and influence policy and support for bicycle infrastructure; and
c. Recommend actions towards institutionalizing bicycle traffic data collection and analysis.

2. COUNT METHODOLOGY

The June Bike Count Project is a one-day event conducted by volunteer counters on standardized count sheets adapted from the US National Bicycle and Pedestrian Documentation (NBPD) Project[3].

2.1 Type of count

The JBCP is considered a short-duration count program which is one of the two basic elements of a bicycle and pedestrian count program done in other countries. The other one is the permanent count program, which involve putting up automated counters that count continuously 24-hours per day for at least one year at a given location.

Short-duration count programs are relevant and useful if there are issues or challenges such as lack of budget and inaccessible count technologies. Two-hour morning and afternoon count

[2] Active transport, or active mobility refers to non-motorized means of transport (NMT) of people and goods, which requires human physical activity.
[3] Complete information on the project is available at bikepeddocumentation.org.

periods provide invaluable data, but this methodology poses difficulty making annualized assumptions from this data. A single day does not represent typical travel patterns. (Portland State University)

This is recognized by the JBCP as "annualized data is critical because it provides the ability to understand change and forecast trends. Without comparable annualized walk and bike figures, it is more difficult to make a case for investments in these modes." (Alta Planning, 2016)

The JBCP adopted the count forms (table and diagram/movement) from the NBPD Project, and these were used to record the data aimed at answering the following questions:

a. How many people on bicycles are there?
b. IIow many are women are riding?
c. How many are wearing helmets, how many are not?
d. When is the busiest hour?
e. Which routes are riders using?

The bike count volunteers counted at intersections and along a road or path segment. This is important to the project as it want to capture turning movements at intersections. The project also counted along a road segment (also known as screenline counts) because any bicyclist or pedestrian who crosses an imaginary line drawn perpendicularly across the segment that is counted help establish volume of bicycle traffic on that location. The illustrations below depict these two types of counts.

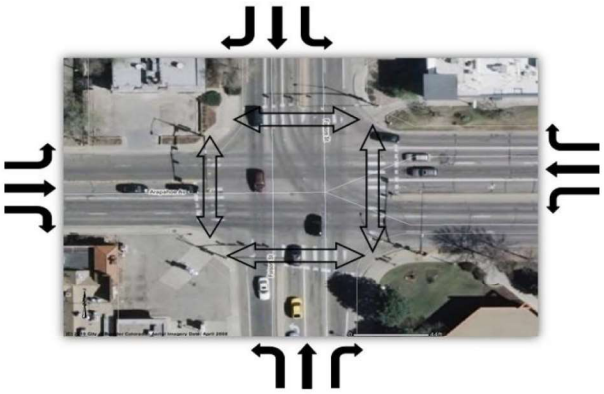


Figure 1. Intersection counts with turning movements

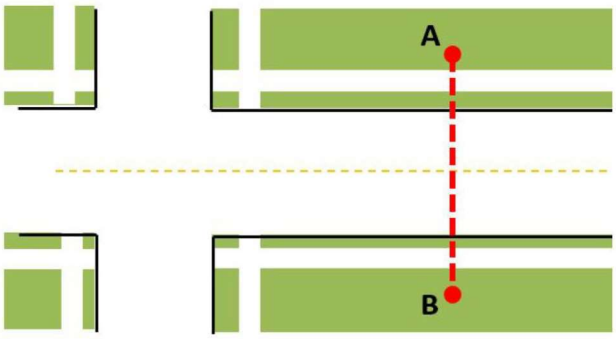


Figure 2. Segment (screenline) counts

2.2 Select Count locations

The project coordinated the count location selection with the partner local governments. The sites are nominated by the LGUs with input from traffic engineers, transport planners, and other transport officers. Count site selection considerations included a focus on both known high-volume and lower volume bicycle traffic, absence, and presence of bike facilities (bike lanes), existing land uses, e.g., commercial establishments, schools, workplaces, etc.

A key factor to the final count sites is the availability of resources and volunteers.

2.3 Count forms

The counts were conducted by volunteer counters who record all movements, gender of riders and their observations in fifteen-minute time intervals on standardised count sheets. There are two types of count forms: table and diagram. The table count form tracks for gender and helmet use while the diagram count form captures turning movements of people on bicycles.

Table Count Form

LOCATION:	DATE:	TIME: × 06:00am - 08:00am × 04:00pm - 06:00pm
WEATHER:	NAME:	
NOTES:		TOTAL NO. CYCLISTS COUNTED:

Time Interval	MALE		FEMALE		NOT DETERMINED	
	With Helmet	No Helmet	With Helmet	No Helmet	With Helmet	No Helmet
00:00-00:15						
00:15-00:30						
00:30-00:45						
00:45-01:00						
01:00-01:15						
01:15-01:30						
01:30-01:45						

Figure 3. Table count form

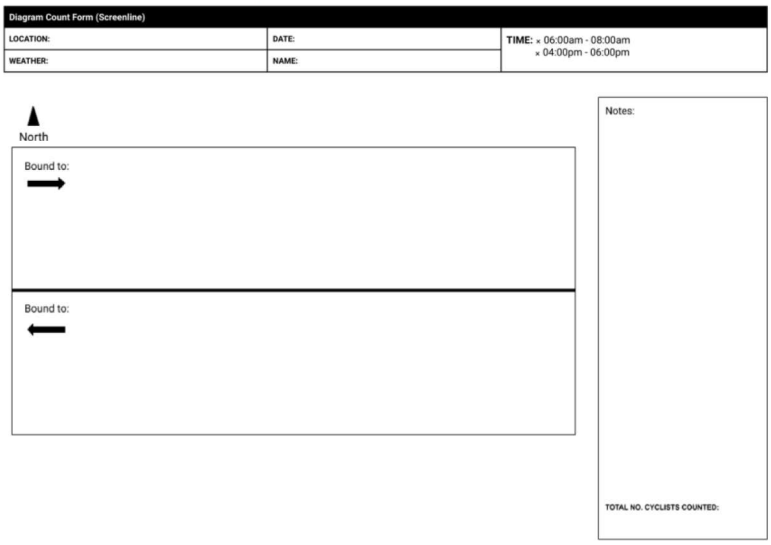


Figure 4. Diagram count form

2.4 Data processing

Following the completion of the visual count, counters send their data to the Mobility Awards team by submitting the completed tally sheet via email and messenger application. Also, hard copies were obtained by the project from count volunteers.

The submitted data are validated, analyzed, and visualized by the Mobility Awards, and subsequently compiled into reports for the partner local governments.

3. BIKE COUNT RESULTS

3.1 Volume

Total bicycle traffic volume counted by the volunteers is 54,084 and this was based on the diagram count form[4]. Quezon City has the highest number of people on bicycles counted at 22,010 followed by Pasig City with 16,238. A plausible reason for this is the number of count locations per city which, in turn, is influenced by the number of volunteers who signed up and resources (e.g., city government staff) provided by the partners local governments. Quezon City had 13 count locations which is the highest among the four participating cities.

Figure 5. Bike count by city

Thu busiest site per city as are follows:

a. Quezon City – Intersection of EDSA and Aurora Boulevard (4,286 movements)
b. Marikina City – T-junction at Marikina - Infanta Highway (R6) and Nicanor Roxas Street (4,209 movements)
c. Pasig City – T-junction at Ortigas Avenue and Meralco Avenue (3,214 movements) and T-junction at C. Raymundo Avenue and F. Legaspi St. (2,568 movements)
d. San Juan City – Intersection at Ortigas Avenue and Col. Bonny Serrano Avenue and Granada Street (2,381 movements)

3.2 Gender

Female represented only 2% of bike riders across the four participating cities.

[4] The counts based on gender, helmet use and peak hour vary if compared to the diagram count

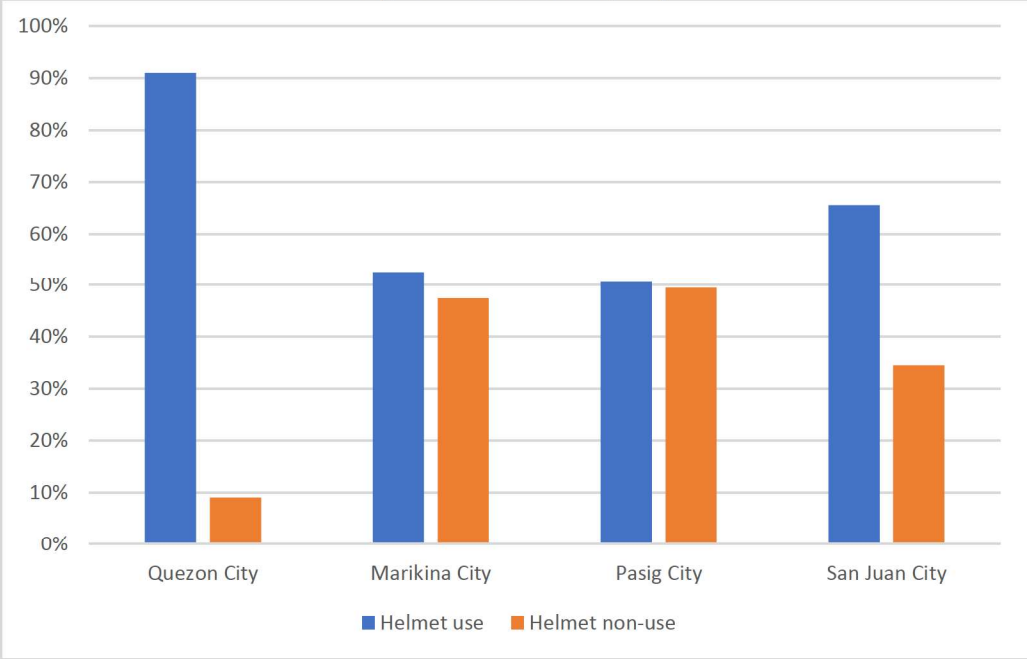
Table 3. Gender ratio by city

	Male	Female	Undetermined
Quezon City	98.59%	1.29%	0.12%
Marikina City	96.83%	2.72%	0.45%
Pasig City	97.95%	1.98%	0.07%
San Juan City	96.35%	3.55%	0.10%
Total	97.78%	2.03%	0.19%

3.3 Helmet-use

At least half of the counted people on bikes use helmet with Quezon City having the highest figure at 91%. This could be attributed to the well-publicized and campaigned city ordinance on mandatory bike helmet use.

Figure 6. Helmet use by city



3.4 Bike Traffic Flow

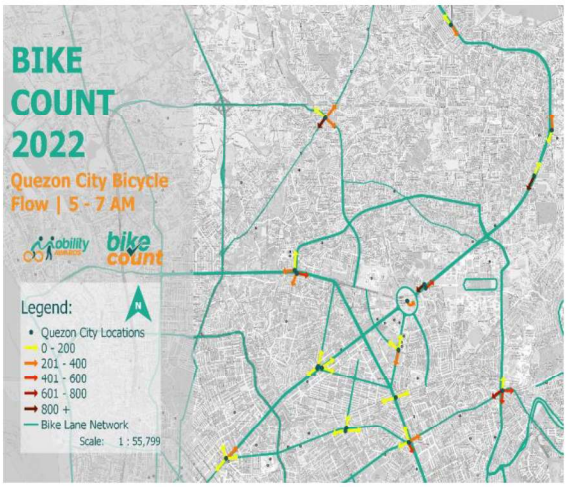


Figure 7. Morning bike traffic flow, QC

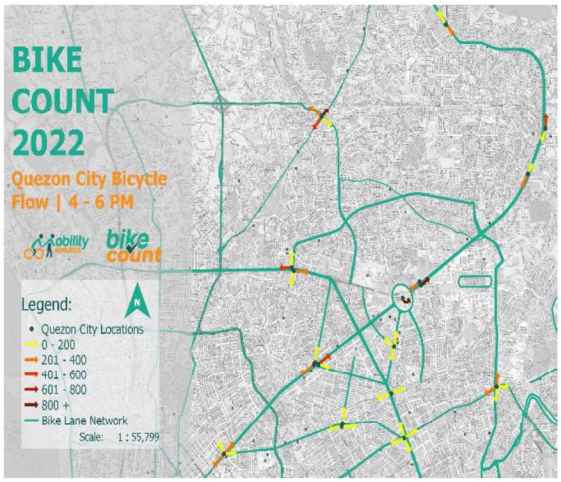


Figure 8. Afternoon bike traffic flow, QC

In Quezon City, it is observed that most of the cyclists were headed southwest during the morning - especially those coming from Commonwealth Avenue, potentially entering the business district areas of Quezon city (which is around the Triangle Park, as observed from the high volume of cyclists to Quezon City from Welcome Rotonda) and/or Manila, Ortigas, Pasig, and Makati.

During the afternoon count in Quezon City, it is observed that many of the cyclists were headed outward of Quezon city. To the North, this consists of those residing along Commonwealth Avenue and heading to Bulacan; West side to NLEX and Malabon/Navotas via Quirino Highway corner Mindanao Avenue and Aurora Blvd corner EDSA; Southeast bound to Manila via Welcome Rotonda.

Count locations at Commonwealth Avenue corner Batasan road, and Commonwealth Avenue corner Regalado (going to Elliptical Road) do not have bike lanes at present. "Copenhagen Left"[5] is also observed at the East Avenue corner BIR road.

Identified Areas with High Volume of Counterflow

It is observed that cyclists counterflow along the following roads: Commonwealth Avenue specifically at Holy Spirit Drive, Batasan T-junction and PHILCOA area; and E. Rodriguez Avenue corner Tomas Morato Avenue.

Anecdotal evidence suggests that due to the expansive width of the Commonwealth Avenue, cyclists will prefer to cycle in the side of their destination, rather than take turning slots or footbridges.

[5] "As a general rule in Denmark, cyclists are required to make a wide left turn where they cross the perpendicular street and wait to cross the original one. The space between the crosswalk and bike lane becomes a waiting area for the cyclists turning left. Those who are continuing straight are supposed to stop before the crosswalk.". Retrieved from https://betweenyellowandblue.wordpress.com/2009/04/08/copenhagen-to-two-wheels-part-1/

Counterflowing cyclists is an indicator of the needs and preferences that should be considered in designing and building bicycle facilities such as bi-directional and protected bike lanes.

These users' needs and preferences are also influenced by the current conditions like the distance between turning slots and footbridges that follow motor vehicle traffic direction. These are usually long, and inconvenient for cyclists who prefer a more direct and shorter route to reach their destinations. All these factors, however, need to be validated and supplemented with lane user surveys.

Obstruction of Bike Lanes in Unloading/Loading Areas (Transit Stops)

Counters also observed that the bike lanes in Quezon Avenue, EDSA corner Kamias Road, and Congressional Avenue along EDSA corner Roosevelt Avenue during peak hours are obstructed by vehicles (mostly public utility vehicles such as jeepneys and buses), motorcycles as, well as commuters waiting for PUVs. These areas have high volume traffic and are conflict areas due to inefficient design and implementation of transit stops.

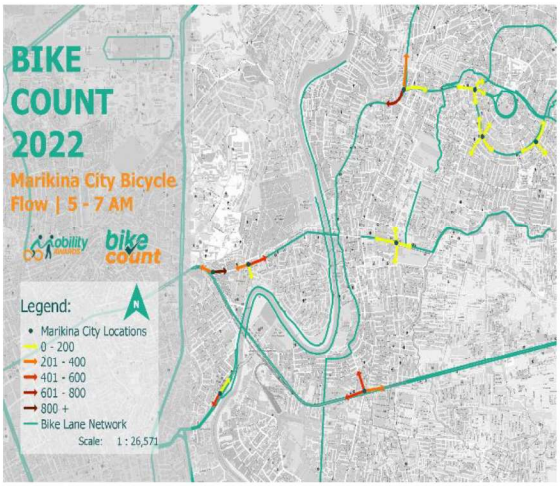


Fig 9. Morning bike traffic flow, Marikina City

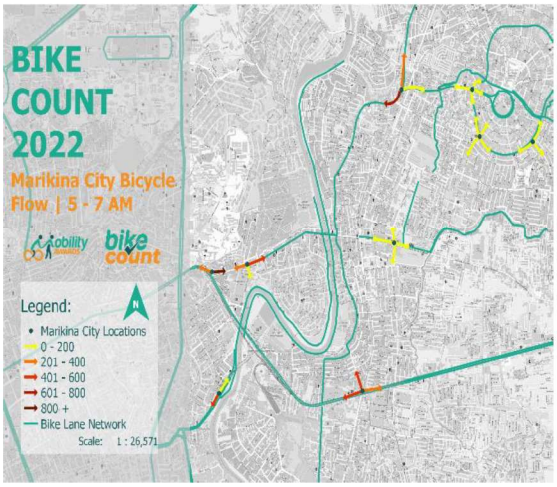


Fig 10. Afternoon bike traffic flow, Marikina City

In Marikina City, it is observed that most of the cyclists counted were headed to Quezon city in the morning - with high volume along A. Bonifacio Street going west, J.P Rizal to the North, and FVR road going to Brgy. Libis (Eastwood). There is also a high bike traffic volume along Marikina-Infanta Highway on three directions towards the direction of Quezon city, Antipolo, and inward Marikina (to Marikina City Hall).

During the afternoon count, it is observed that there is not so high volume of cyclists aside from the main road, Marikina-Infanta Highway bound for Quezon City. It is also observed that cyclists use the pedestrian crossing (rather than go with the motor vehicle traffic flow) to cross the street, most evident in Gen Ordoñez Avenue corner Katipunan Avenue.

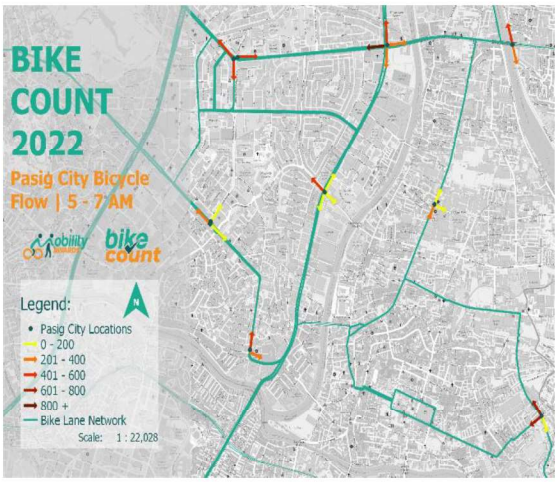


Fig 11. Morning bike traffic flow, Pasig City

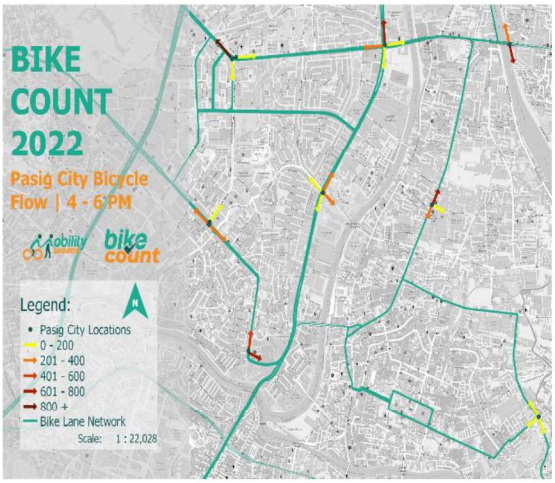


Fig 12. Afternoon bike traffic flow, Pasig City

In Pasig City, it is observed during the morning count that there is a high volume of cyclists around the three (3) Ortigas Avenue count locations that connects the city to the east of Metro Manila (Rizal province). The high bike traffic volume supports the long-held notion that major thoroughfares such as Ortigas Avenue (which is also one of the radial roads of Metro Manila) is the most direct route for people on bicycles to get to their destinations. This road serves as connector the business districts not only in Pasig (Ortigas Center) but also in other points in the metro.

Conversely, in the afternoon, the movement of the cyclists' traversing Pasig City is from west to east suggesting that bike commuters are heading to their homes (origin points).

Many count locations in Pasig City have been observed with high volume of counterflow movements such as in Ortigas corner C-5, Pasig Boulevard, C-5 corner Lanuza. Specifically, large group of cyclists counterflow (from Lanuza Avenue going to Libis) to go to Kaginhawaan bridge, similar observations were made in Shaw Boulevard, and Ortigas Avenue corner Meralco Avenue. Most cyclists traversing these locations tend to do Copenhagen lefts/two-step left turns. Sometimes, the first step ends not at the corner but in the middle of the intersections (traffic island or road median).

Bike boxes are highly crucial in these areas to support and protect crossing cyclists. In C-5 corner Lanuza particularly, cyclists are mostly counterflowing cyclists to get to Dr. Sixto via Kaginhawaan Bridge, where there are residential areas. Most of the cyclists still follow the traffic lights as enforced by the MMDA.

Counters noted that there are no bike lanes on two count locations: East Bank Road, and Sandoval Avenue corner Urbano Velasco street. Newly painted bike turn lanes are recognized by the counters along Ortigas Avenue corner Meralco street; Bollard-protected Bike lanes along C5 corner Lanuza; and a common behavior of Copenhagen turn within the count locations.

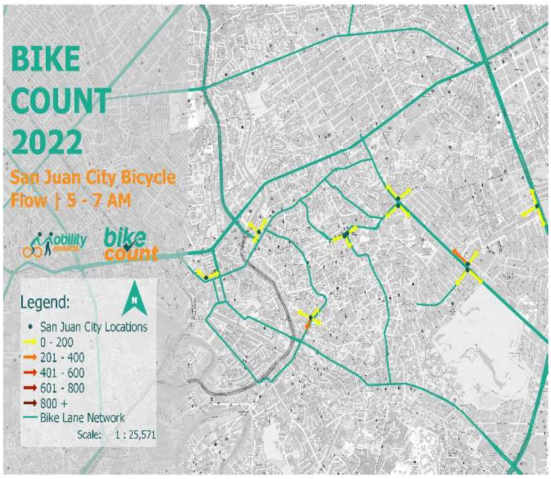


Fig 13. Morning bike traffic flow, San Juan City

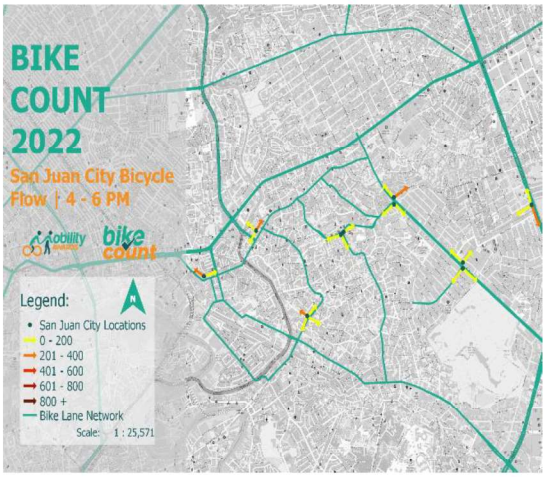


Fig 14. Afternoon bike traffic flow, San Juan City

San Juan City had the lowest bike traffic count. is a one-way street. Counterflowing movement is observed on A Mabini corner Wack-Wack and EDSA corner Annapolis (near the MRT Santolan station). It is assumed that counterflowing cyclists are heading towards Bonny Serrano Avenue and on to their destinations westward (Quezon City) and eastward (C5 Katipunan area)

5. CONCLUSION

This paper presented the data collected in support of efforts to capture bicycle traffic data to support more investment towards bicycle facilities. Data includes volume of bicycle traffic, gender distribution, helmet use and cycling movements. Such data are relevant in understanding bicycle traffic and designing the appropriate infrastructure and program, justify funding and value the socio-economic benefits of walking and cycling to cities.

The June Bike Count project demonstrates that Metro Manila has existing bicycle traffic that deserves to be counted and made part of policy making and infrastructure development. The project is an initial attempt that seeks to push government, the academe, and other stakeholders to establish a consistent and formalized national methodology for conducting bicycle and more importantly, pedestrian count and surveys.

The June Bike Count project is a call for action for government to create a national database of bicycle count information generated by these consistent methods and practices and use the count information to begin analysis on the relationships of bicycle activity and factors such as land use, demographics, local economic development, etc.

However, the short-duration count program has its limitations in terms of methodology and logistical challenges.

According to the US Federal Highway Administration, “the preferred length for short-duration counts is 12 hours, which permits calculation of time-of-day use profiles. However, it is recognized that available resources may limit the collection of 12-hour counts. The prevailing

practice for short-duration manual counts has been 2 hours, largely because of resource and manual observer limitations. There is recognition that 2 hours of count data are better than no data; however, 2 hours of count data may lead to high error rates when annualizing counts and could lead to erroneous conclusions." (FHWA, 2016) Thus, the organizers of the June Bike Count project strongly suggests that both national and local governments including the MMDA to use automatic counter equipment to complement short-duration counts such as the JBCP.

Notwithstanding the inherent limitations of manual and volunteer bike counts, short-duration and manual bike count programs offer many benefits: "they are great community building exercises that help to engage advocates and highlight the importance of walking & biking. Some communities may not have the resources to purchase and install automated counters, making manual count programs the most economical option. (If) an automated program cannot be implemented, manual counts should continue to be conducted as usual. They can quickly produce data in locations of interest (e.g., high crash locations, corridors that are under review for design changes).

They can be combined with automated technology, such as mobile applications that replace clipboards with counting boards or screens. They are used before deploying automated devices to study a given location's suitability for automated counters. They are also used after automated devices are installed to calibrate and confirm data collected through automated means." (Alta Planning, 2016)

One of the highlights of the JBCP is documenting the significant gender gap in everyday cycling that needs to be addressed urgently. While the bike count is limited to those who rode their bicycles during the peak commuting hours, the bike data strongly suggests that there is work to be done to encourage more women to cycle as mobility or trip choice in Metro Manila. More studies should be done to learn and understand the unique cycling needs and preferences of women in an urban context like Metro Manila.

Another key area for study and action is bicycle users' behavior. Turning movement counts are useful for traffic impact studies and safety studies. These counts are used to determine exposure rates at high collision crossings, as well as to retime or reconfigure traffic signal phasing. Rather than penalizing what are seemingly illegal bike traffic flow such as counterflowing, policymakers, traffic planners and others need to collect data on cycling movements, relate it to cyclists needs and preferences to produce better bike facilities like bidirectional bike lanes, bike, and pedestrian bridges, end-of-trip facilities (bike parking), etc.

Bike count programs are essential part of a city or urban transport playbook to get more people cycling as everyday transport. These need to account for existing bike traffic and in locations where there is potential growth. But aside from collecting and analyzing bike count data, government, citizens, and advocates of cycling need to use this bike count data "to show how investments in infrastructure result in changes to bike ridership, safety, better access to opportunity, and a more efficient use of the street. By being intentional about what data you are collecting and how you present it, the fuller story of biking in your city can make the case for the most impactful investments in bike infrastructure." (NACTO, 2022)

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DISCLOSURE

Any opinions stated in this manuscript are those of the authors.

COMPETING INTERESTS

The authors declare no competing interests regarding the presentation or publication of this paper.

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