Characterization of Truck Traffic in Metro Manila

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Abstract: This study characterized the existing truck routes and truck behavior with and without restriction policies. The study conducted interviews of 390 truck drivers from different trucking companies in different locations such as in the truck company's depot and in the port of Manila. GPS data logger was used to track the travel and route of a sample truck vehicle while EMME4 was employed in the simulation of the truck shortest path. The study found out that congestion is evident along the truck routes, truck ban regulations are varied and uncoordinated across cities, and truck trips were longer with a slower speed. The study recommended that truck policies in Metro Manila should be reviewed and reassessed for the enhancement of these policies which lead to a better truck oriented management.

Keywords: Trucking, Truck Traffic, Truck Policies, Restriction time

1. INTRODUCTION

The trucking industry is a large and important sector in our transportation system. It provides and serves our nation by transporting raw materials, work in process, and finished products that everything the society needs. Trucks contribute a lot in our economy as a means of freight movement in most of the major industries like in manufacturing, construction, electronics, petroleum, automotive, health and food industry. Trucks play a significant role in our transport system, but these vehicles are not always properly considered in road planning, design, operations, and management.
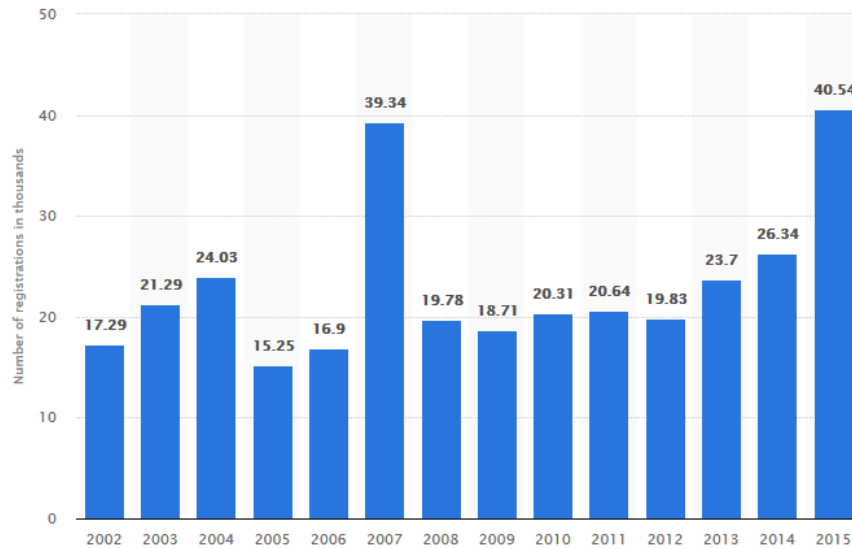
Figure 1. Number of new truck registrations in the Philippines (Source: PSA, LTO)
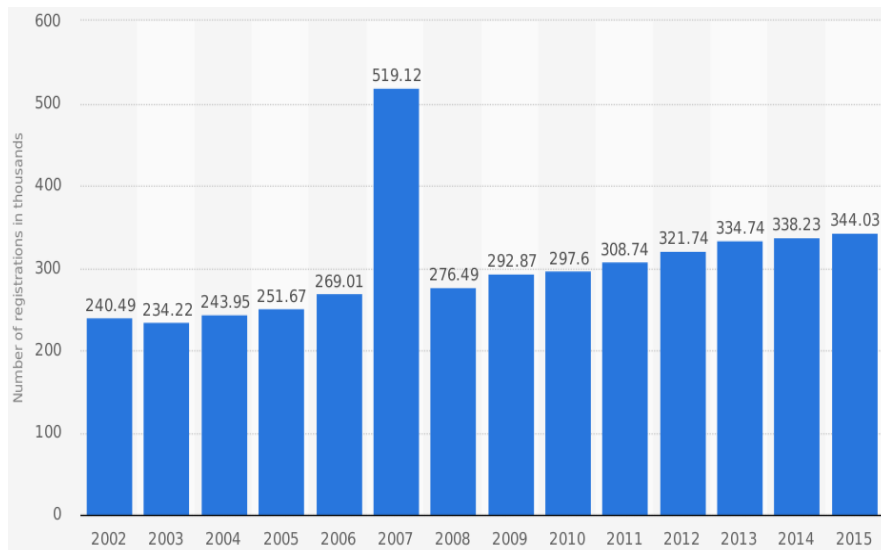

Figure 2. Number of truck registration renewals in the Philippines (Source: PSA, LTO)

Figure 1 and 2 show the number of new truck registration and number of truck registration renewals in the Philippines from 2002 to 2015 in thousands. There is an increasing trend from 2010 to 2015 and a huge percentage change from 2014 to 2015 for new truck registrations.

In Metro Manila, there a lot of issues and concerns that need to be addressed concerning trucks. Such as the increase traffic of container and cargo trucks, traffic congestion in city's streets due to slow moving of trucks, ports congestion and pollution from trucking operations as shown in figure 3.

Figure 3. Congestion due to slow moving of trucks

One of the schemes used to address traffic congestion is the introduction of the truck ban. The truck ban was implemented by the Metropolitan Manila Development Authority (MMDA) in 1978 to lessen the worsening situation of traffic congestion with the perception that the trucks of freight companies are the main reason of congestion along major roads in Metro Manila.

Other truck regulations that being implement at the moment are one truck lane policy and anti-overloading. The former aims to prevent accidents and address heavy traffic while the latter purpose is to promote safety and prevent premature deterioration of the road.

Despite of this truck regulation, traffic congestion still exists in the major routes in Metro Manila. Even worse, it is sometimes the cause of port congestion specifically in the International Port of Manila that would lose in billions of pesos in the economy. By this problem, this study would like to describe the truck traffic, truck routes and truck behavior in order to plan and propose possible intervention to improve travel times, lessen the impact of congestion and pollution, and reduce truck accidents.

The main objective of this study is to characterize the existing truck routes and truck behavior that affect urban travel movement in Metro Manila for the enhancement of policies affecting the truck industry and goods movement as well as urban travel in general.

The study is focus on the truck traffic in the major routes in Metro Manila specifically on the routes where truck ban is implemented and alternative routes for trucks. The study will provide information that will impart government agencies, trucking companies and other stakeholders concerning the current issues and problems of the truck movements and operations in the Metro Manila. This research is geared toward the enhancement policies for a better truck-oriented management in Metro Manila.

2. REVIEW OF RELATED LITERATURE

There are several literature in the past that studied issues and problems pertaining to trucks routes and trucks behavior. One of these concerns is the selection of routes. For example, Sun (2013) studied the decision-making process and the factors which influence the truck drivers in choosing of routes while Sekiya et al. (2011) focused their study on how the characteristics of container cargo helped and contributed in route selection. Their findings are more on time of day, freight

value, characteristics of the truck driver and characteristics of the cargo which did not considered the transport facility and restriction policy.

Traffic congestion is a huge problem in many metropolitan areas especially in developing countries. Congestion increases travel time, air pollution, vehicle emissions and usage fuel for the reason that vehicles cannot flow efficiently. These would translate to billions of losses in the country's economy. There are studies that present congestion problem and proposed method to mitigate congestion. Cherry & Adelakun, (2012) focused on edifying perceptions of truck drivers to urban congestion and safety challenges and gauges their interest in potential geometric or operational solutions, including managed truck lanes and tolling while Zhu et al. (2014) proposed a method to find a maximum-capacity path subject to a length constraint with the exclusion of routes that may be very long to be considered environment-friendly and cost-effective. On the other hand, Patalinghug et al. (2015) identified the impacts in the port congestion of Manila. These are the trucking services' increase of cost, delay in the discharging of cargo and distribution of goods to consumers, delay in mooring, loading, and releasing of cargoes because of the insufficient of the storage area in the ports, and struggle of unloading unfilled containers.

There are few studies about truck regulation and truck restriction policy done in the past. The necessity to study the truck regulation and truck restriction policy such as truck ban is highly important in the present time. Castro et al. (2003) discussed the impact of the existing truck ban on Metro Manila's urban transport system. They compared the traffic patterns in the form of loaded traffic flows in the road network for different truck ban schemes to determine the effectiveness of the truck ban. On the other hand, Siuhi and Mussa (2007) emphasized the need to study the restriction on the truck lane happening unlimited access highways because of the majority of the studies in the evaluation of the restriction on the truck lane were performed on limited access highways while Hang & Li, (2010) developed a methodological framework using System Dynamics for regulation evaluation of truck weight.

Mwakalonge and Moses (2012) evaluated the effect of various traffic, geometric, and signalization variables which could impact the operating efficiency and safety of the restriction on the truck lane in unlimited access highways, predominantly on city major roadways with substantial volume of the truck. Lyons et al. (2017) presented a macroscopic analysis of the impact on the time restriction policy for heavy trucks on the main access corridors in Mexico City pertaining to the traffic congestion and local pollutant emissions which includes the NOx and CO.

A number of algorithms for the shortest path problems with fixed, deterministic link travel costs have been proposed, and the standard shortest path algorithms such as Dijkstra's algorithm (Papadimitriou and Steiglitz, 1998) are very popular. Fu and Rilett (1998) studied a dynamic and stochastic shortest path problem and suggested a heuristic based on k-shortest path algorithm to find the expected shortest path. Kang and Ouyang (2011) extended the stochastic traveling purchaser problem in which multiple sellers offer stochastic prices for different commodities, and the purchaser chooses to visit sellers of each commodity while minimizing the total travel and purchase cost.

3. METHODOLOGY

The study area is in Metro Manila. Specifically, the routes where truck ban were implemented. Also, considered in the study are the alternate truck routes. These are the north route which from

North Luzon Expressway (NLEX) to the port and vice versa, the south route which from South Luzon Expressway (SLEX) to the port and vice versa, and Cavite to the port and vice versa.

This study is a descriptive research which describe the existing truck routes and characterize the behavior of the truckers with and without restriction policies. The study used interview questionnaire to gather information from the truck drivers. There were 390 truck drivers interviewed in different locations particularly in North Harbor and South Harbor in Manila and in truck companies' depot in Cavite and Rizal. The gathered data were processed and analyzed to come up with results and findings in the study.

The study also used GPS data logger. It was installed in the sample truck vehicle to track the behavior and movement of trucks and which routes they are using from their origin to their destination. The GPS data logger records data like travel distance, travel time and delay.

Secondary data such as truck traffic from government agencies, Metropolitan Manila Development Authority (MMDA), Department of Public Works and Highways (DPWH) and ordinances from 16 cities and 1 municipality were also used in the study. Also, the study utilized transportation software (EMME4) to show the routes and behavior of trucks and simulate their movement using shortest path considering truck ban and mabuhay lanes traffic scheme.

4. RESULTS AND DISCUSSION

4. 1 Truck Traffic

Table 1 shows the truck traffic volume form MMDA for the past 6 years in circumferential and radial road in Metro Manila. There was a decline in 2014 and 2015 due to lack/no data in some of the survey station but there was a significant increase from 2015 to 2017.

Table 1. Truck Traffic Volume (vehicles)

Circumferential and Radial Road		2012		2013		2014		2015		2016		2017	
		Truck	Trailer	Truck	Trailer	Truck	Trailer	Truck	Trailer	Truck	Trailer	Truck	Trailer
C:1	Recto	702	250	939	347	816	382	769	16	703	13	584	3
C:2	Mendoza	5,253	1,237	5,093	1,000	4,374	398	4,007	506	3,462	265	5,102	731
	Pres. Quirino Ave.	7,788	2,556	6,729	2,204	7,130	2,398	6,421	3,070	7,075	2,358	5,958	981
C:3	Araneta Ave.	4,401	411	6,297	815	4,291	796	4,393	528	4,135	599	4,163	607
C:4	Edsa (Buendia Ave.)	5,023	43	4,491	4	4,417	1	5,451	8	5,556	2	8,830	2
C:5	Katipunan/C. P. Garcia	7,289	554	7,142	817	10,508	914	10,458	922	12,411	1,101	10,121	680
R:1	Roxas Blvd.	363	37	459	7	391	-	831	50	926	1,137	747	1,111
R:2	Taft Ave.	223	13	435	53	404	1	650	15	543	6	640	10
R:3	SSH	7,703	3,413	7,323	2,508	9,484	807	7,184	3,921	5,550	1,633	5,182	2,376
R:4	Shaw Blvd.	1,493	200	1,458	64	1,133	67	1,603	164	1,480	175	1,054	126
R:5	Ortigas Ave.	1,858	212	4,336	562	4,252	352	5,039	428	5,162	616	5,029	681
R:6	Magsaysay Blvd.	2,269	289	2,118	379	2,543	313	2,228	429	3,125	491	2,859	336
	Aurora Blvd.	4,124	326	4,255	386	2,290	27	2,168	30	2,358	37	3,674	712
R:7	Quezon Ave.	3,110	389	5,326	316	4,061	570	4,337	329	4,081	163	3,664	244
	Commonwealth Ave.	5,666	-	6,084	306	5,356	217	6,307	256	6,837	271	7,822	518
R:8	A. Bonifacio	9,509	2,495	10,038	2,784	9,230	3,939	6,736	2,867	6,554	3,221	9,278	3,915
R:9	Rizal Ave.	1,810	6	1,987	7	1,787	4	1,948	7	2,168	7	2,012	3
R:10	Del Pan			4,455	6,566	4,974	3,856			4,989	8,290	5,686	7,886
	Marcos Highway	7,030	749	7,237	475	6,524	533	6,394	548	5,431	439	5,684	412
	McArthur Highway	4,236	435	3,538	305	3,681	402	4,031	541	2,732	288	3,208	506
	Total	79,850	13,615	89,740	19,905	87,646	15,977	80,955	14,635	85,278	21,112	91,297	21,840

In 2017, the highest recorded truck volume for combined data of truck and trailer are in Radial road 9 (R:9 Del Pan) which is 13,772; in Radial road 8 (R:8 A. Bonifacio) which is 13,193;

and in Circumferential road 5 (C:5 Katipunan) which is 10,801. And the total truck and trailer volume for 2017 is 113, 137.

We conducted observation on the behaviour of trucks along C5 where one truck lane policy is implemented. After the truck ban time, 30 minutes to 1 hour, we observed that trucks were starting to line up on the road shown in figure 4 between 10:30 to 11:30 in the morning.

Figure 4. Queue of trucks along C5 after Restriction Time

We also recorded travel of information of a sample truck vehicle from one of the trucking companies with use of GPS data logger shown in figure 5. The truck travel started from its company depot in Bulacan Area around 10:00 in the morning, then travel to port area to pick up the shipment and delivered the shipment to Laguna area around 4:25 in the afternoon. The truck travelled during no truck ban time with a total travel time of 6 hours and 26 minutes. The total running time is 2 hours and 32 minutes and the total stopping time is 3 hours and 55 minutes. The total distance travelled is 45.38 kilometers with an average speed of 12.2 km/h.

Start: 2018-05-19 9:58:23
End: 2018-05-19 16:24:15
Total travel time:
    6 hours 25 minutes 52 seconds
Total running time:
    2 hours 31 minutes 58 seconds
Total Stopping time:
    3 hours 54 minutes 53 seconds
Distance: 45.38km
Average speed: 12.2km/h
Max speed: 69.0km/h

Figure 5. Truck Travel Log

4.2 Truck Existing Policies

Truck Ban

The truck ban was first implement in November 21, 1978 with an Ordinance No. 78-04. The truck ban during that time was from 6:00 AM to 9:00 AM and 4:00 PM to 8:00 PM. From there, this ordinance had evolved and revised until this present time.

In Ordinance No. 5 Series of 1994, there are two types of truck ban. One is the all-day truck ban in the circumferential road of Epifanio delos Santos Avenue (EDSA), which prohibits trucks to pass from 6 AM to 9 PM during weekdays. The other one is the peak hour truck ban in the 10 major road, which prohibits trucks to pass from 6-9 AM and 5-9 PM except Saturdays, Sundays and holidays.

At present, there is a truck ban implemented in major routes in Metro Manila from 6:00 a.m. to 10:00 a.m. and from 5:00 p.m. to 10:00 p.m. every day except Sundays and Holidays. The difference from Ordinance No. 78-04 to Ordinance No. 5 Series of 1994, and to the MMDA Resolution No. 3, s. 2015 -present time restriction is shown in table 2. The main goal of this policy is to reduce the worsening traffic condition in the city. This is applied to more than 4,000 kilograms gross vehicle weight of cargo trucks. But there is exemption to this rule. It exempts the cargo trucks loaded with perishable and agricultural cargo, as well as the trucks registered under Terminal Appointment Booking System (TABS). TABS is an electronic platform used to book containers at Manila South Harbor and Manila International Container Terminal (MICT) which mainly aims to reduce trucks during traffic peak hours without making a negative impact to the number of exports and imports passing through the ports.

Table 2. Truck Ban Restriction Time

Time Restriction	Morning	Afternoon/Evening
Ordinance No. 78-04	6:00 a.m. - 9:00 a.m.	4:00 p.m. -8:00 p.m.
Ordinance No. 5 Series of 1994	6:00 a.m. - 9:00 a.m.	5:00 p.m. - 9:00 p.m.
MMDA Resolution No. 3, s. 2015 - present	6:00 a.m. - 10:00 a.m.	5:00 p.m. - 10:00 p.m.

Failure to observe this rules shall be apprehended and pay the fine of PhP 2,000.00 and the driver's licence of the driver who shall apprehended 3 times for violation of truck ban rules shall be suspended for 1 year.

Based on the review of the ordinances of 16 cities and 1 municipality in Metro Manila, 8 cities and 1 municipality are using the ordinance No. 78-04, 2 cities are using Ordinance No. 5 Series of 1994 and 5 cities are using MMDA Resolution No. 3, s. 2015 – present. The common regulation of truck ban in most of these cities specified that vehicles such as cargo trucks, gravel and sand trucks and other heavy cargo trucks with eight wheels and up, or whose gross vehicle weights exceed 4,500 kilograms, including tractor trailers or containerized haulers are not be allowed to travel on any Municipal Streets with no more than two lanes, except along the streets specified as truck routes as reflected in the list of truck routs prepared by the Traffic Management Office and approved by the Sangguniang Bayan.
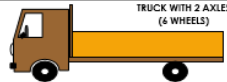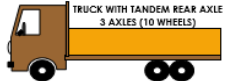
One Truck Lane Policy
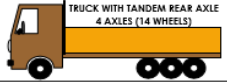
One truck lane policy is implemented along C5, Katipunan Avenue, Congressional Road, Mindanao Avenue and R-10. It states that all trucks shall only use the third lane from the sidewalk and strictly observe the one-lane policy. Moreover, trucks are not allowed to park on any street along C5, Katipunan Avenue, Congressional Road, Mindanao Avenue and R-10 at any time of the day. The cargo trucks with a gross capacity weight of more than 4,500 kilograms are covered with this regulation.

      Failure to observe the one-lane policy shall apprehended and pay the fine of PhP 2,000.00 and MMDA shall recommend shall recommend the cancellation of its franchise and/ or vehicle registration with the Land Transportation Franchising Regulatory Board (LTFRB) and Land Transportation Office (LTO).

Anti-overloading

Another policy related to trucks is Anti-overloading policy. This policy is pursuant to the provisions of Republic Act 8794 otherwise known as "An Act Imposing a Motor Vehicle Users Charge on Owners of all Types of Motor Vehicle and for Other Purposes", which the main purpose is to promote the safety of motorist and prevent premature deterioration of roads cause by overloading. A truck is considered to be overloaded when any of its individual axle exceeded 13.5 tons or it gross vehicle weight exceeded the allowable Gross Vehicle Weight (GVW).

Table 3. Maximum Allowable Gross Vehicle Weight

TRUCK CLASS	MAX. ALLOWABLE GVW (in kg)	TRUCK CLASS	MAX. ALLOWABLE GVW (in kg)
TRUCK WITH 2 AXLES (6 WHEELS)	18,000	TRUCK-TRAILER WITH 2 AXLES AT MOTOR VEHICLE & 3 AXLES AT TRAILER (18 WHEELS)	41,000
TRUCK WITH TANDEM REAR AXLE 3 AXLES (10 WHEELS)	33,300	TRUCK-TRAILER WITH 2 AXLES AT MOTOR VEHICLE & 2 AXLES AT TRAILER (14 WHEELS)	39,700
TRUCK WITH TANDEM REAR AXLE 4 AXLES (14 WHEELS)	35,600	TRUCK-TRAILER WITH 2 AXLES AT MOTOR VEHICLE & 3 AXLES AT TRAILER (18 WHEELS)	43,500
TRUCK SEMI-TRAILER WITH 3 AXLES (10 WHEELS)	34,000	TRUCK-TRAILER WITH 3 AXLES AT MOTOR VEHICLE & 3 AXLES AT TRAILER (22 WHEELS)	42,000
TRUCK SEMI-TRAILER WITH 4 AXLES (14 WHEELS)	40,600	TRUCK-TRAILER WITH 3 AXLES AT MOTOR VEHICLE & 2 AXLES AT TRAILER (18 WHEELS)	43,500
TRUCK SEMI-TRAILER WITH 4 AXLES (14 WHEELS)	39,700	TRUCK-TRAILER WITH 3 AXLES AT MOTOR VEHICLE & 3 AXLES AT TRAILER (22 WHEELS)	45,000
TRUCK SEMI-TRAILER WITH 5 AXLES (18 WHEELS)	41,500		

Revised as of CY2013 (DPWH)

Fine for overloading is equivalent to 25% of the Motor Vehicle User's Charge (MVUC) applicable to the truck at the time of infringement. This penalty can be waived when the recorded GVW is less than 5% of the allowable GVW.

4.3 Truck Driver Survey

The study conduct interview survey from truck drivers. They were interviewed in the Manila Port Area and some depot of truck companies. There were 390 truck driver respondents for this survey. Based on the truck driver's survey, most of the truck drivers are married (65.13%) and belong to the age range of 20-40 years old (65.90%) with the highest educational attainment of high school graduate (69.49%). 68.97 % of the truck driver respondents are 1-10 years in service as truck drivers shown table 4 and 5 respectively.

Table 4. Age and Civil Status of the Truck Drivers

Age	Frequency	Percentage
20 and below	7	1.79
21-40	257	65.90
41-60	122	31.28
Above 60	4	1.03
Total	**390**	**100**
Civil Status		
Single	113	28.97
Married	254	65.13
(Widow/er/Separated)	16	4.10
No Answer	7	1.79
Total	**390**	**100**

Table 5. Educational Attainment and Years of Service of the Truck Drivers

Educational Attainment	Frequency	Percentage
Elementary Graduate	61	15.64
High School Graduate	271	69.49
College Undergraduate	13	3.33
College Graduate	11	2.82
Vocational (2-year College)	29	7.44
No Answer	5	1.28
Total	**390**	**100**
Years of Service		
No Answer	12	3.08
Less than a year	29	7.44
1-10	269	68.97
11-20	52	13.33
More than 20 years	28	7.18
Total	**390**	**100**

With respect to the type of truck vehicle that they are using, Most of the truck drivers are using the semi-trailer with 4 axels(14 wheels), trailer with 3 axels at motor vehicle and 3 axels at trailer (22 wheels), and tandem rear axle 3 axles (10 wheels) shown in figure 6.
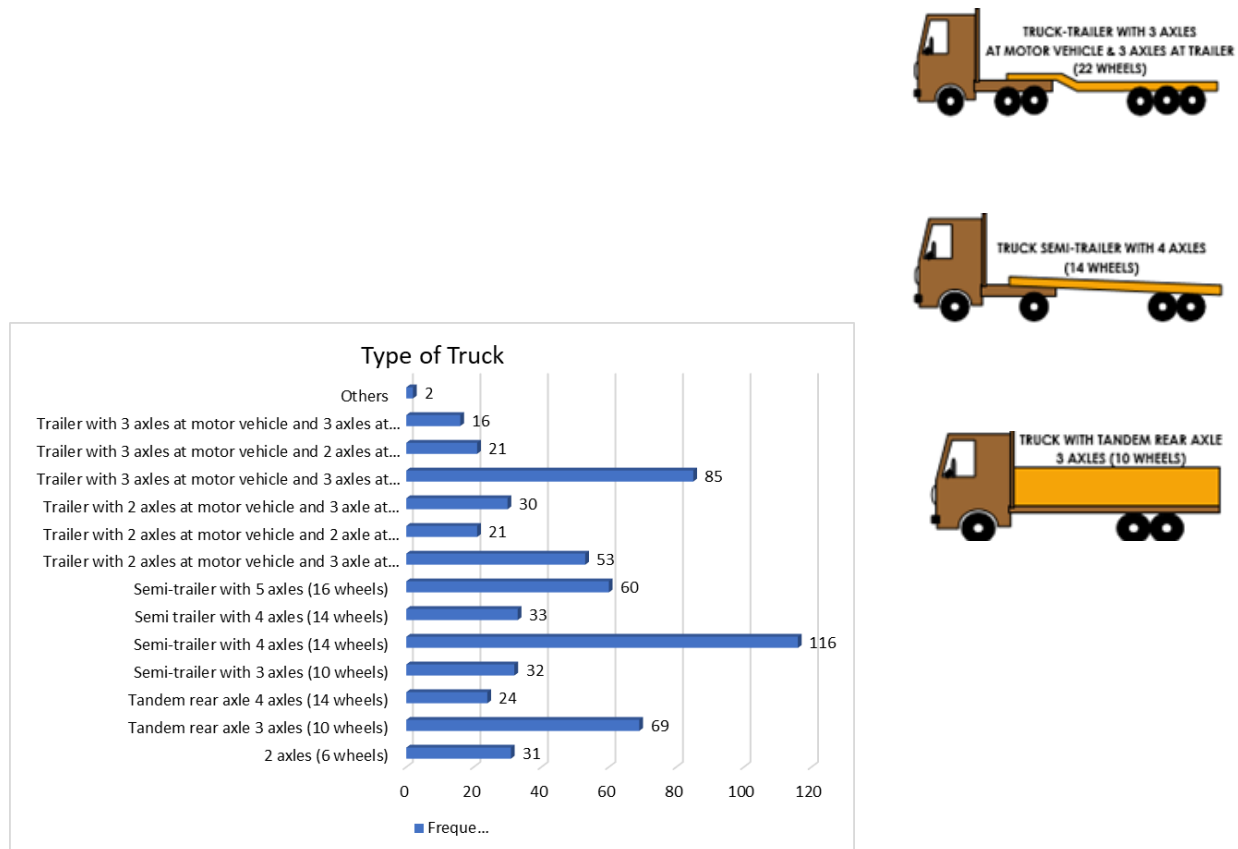

Figure 6. Type of Truck Vehicles

For their trip classification, shown in figure 7, most of truck driver's trips are short haul which is less than 100 km and long haul which is greater than 500 km. Mostly, the type of commodities they are transporting are non-sensitive (67.95%) which includes mostly, construction materials (27.44%) and dry goods (26.41%). Estimated weight of commodities are in the range of 18,000 kgs to 33,000 kgs shown in figure 8.
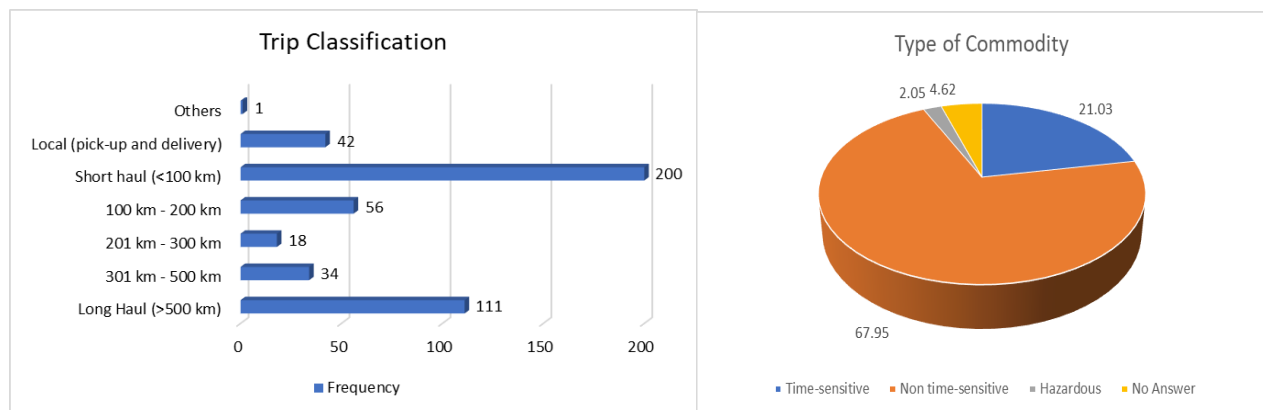
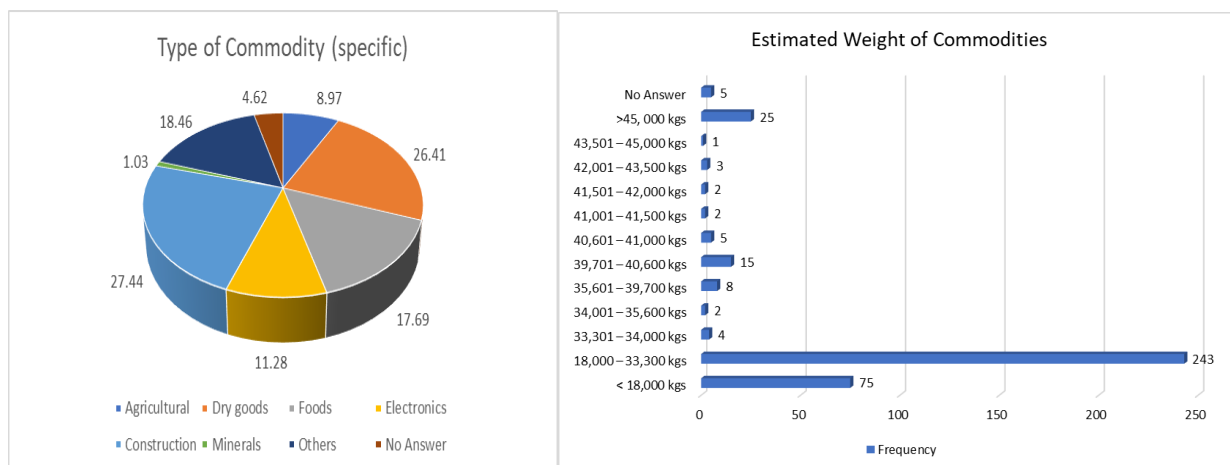Figure 7. Trip Classification and Type of Commodity

Figure 8. Specific Type of Commodity and Estimated Weight

For the operational cost or cost of travel, most of the truck drivers have a fuel cost of 1001-5000 pesos per day (70.51%), toll cost of 201-800 pesos per day (43.85%), and parking cost of 600 pesos and greater (39.74%) shown in Table 6.

Table 6. Fuel, Toll, and Parking Cost

Fuel Cost	Frequency	Percentage
1000 and below	36	9.23
1001-5000	275	70.51
5001-10000	27	6.92
Greater than 10000	11	2.82
Company provided	29	7.44
No answer	12	3.08
Toll Fee Cost		
200 and below	27	6.92
201-800	171	43.85
801-1400	52	13.33

Greater than 1400	35	8.97
Company/E-pass	9	2.31
No answer	96	24.62
Parking Cost		
Below 100	24	6.15
100-299	155	39.74
300-599	33	8.46
600 and greater	5	1.28
No answer	173	44.36

Most of the truck drivers would like to have a separate lane specific for trucks from other mode of transport (75.13%). They want to implement truck ban during morning peak hours shown in figure 9. Most of the strategies they are doing to avoid truck ban are early departure, late departure, and look for truck parking areas. During truck ban times, their strategies are make use of MMDA/Police escort or pay truck ban fee shown in figure 10. Moreover, they always experience extortion from the traffic enforcer.
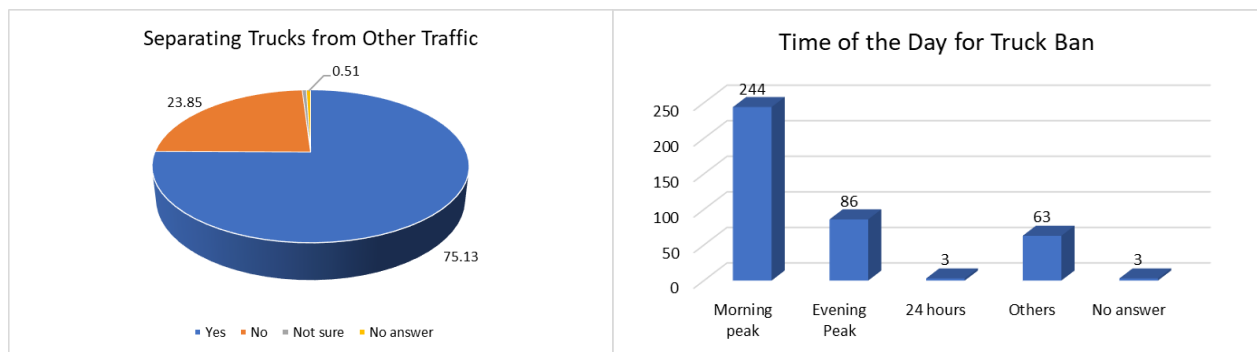

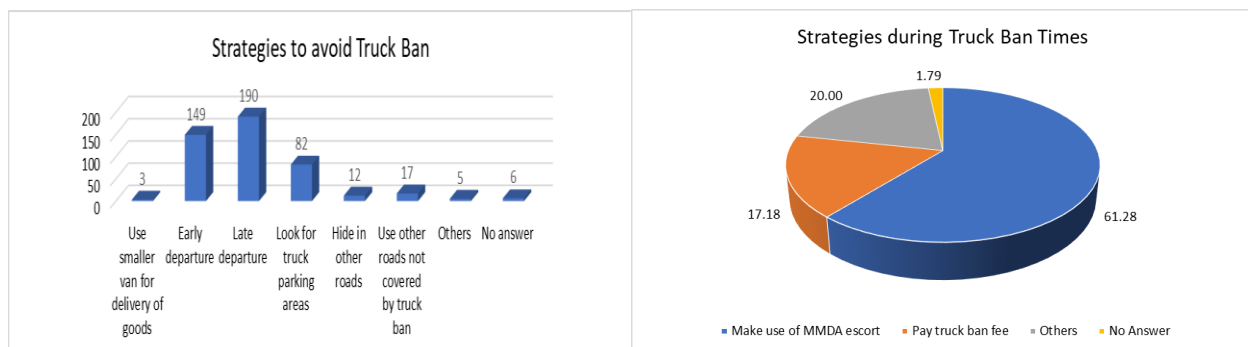Figure 9. Separate Truck Traffic and Time for Truck ban

Figure 10. Strategies to avoid Truck Ban

They have always pre-defined route and they do not change route in case of accidents, heavy traffic, and flooding along the routes. Most of the problem and issues they raised and need

to be improved regarding truck operation in Metro Manila are truck ban or removal of truck ban, heavy traffic, and need of parking shown in figure 11.
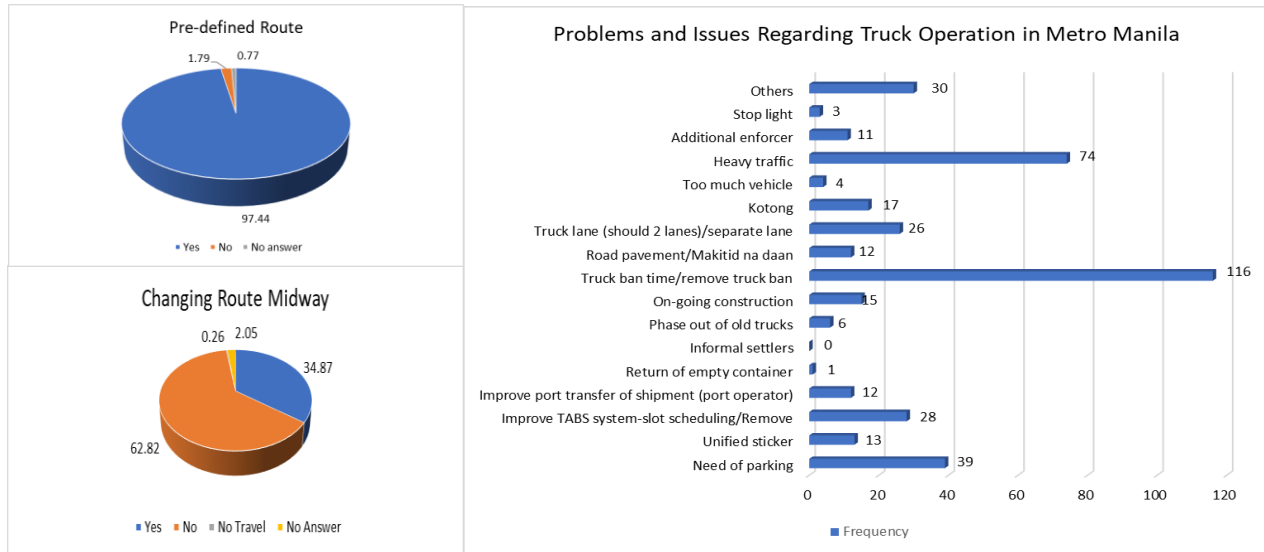

Figure 11. Pre-defined Route, Changing Route, and Problems and Issues of Trucks

4.4 Simulation Using Shortest Path

The study performed simulation of truck routes using shortest path method in EMM4. In this simulation, we consider restriction time which is truck ban and a traffic scheme specifically the Mabuhay Lanes. Mabuhay lanes were considered in the study because it can be a possible routes for truck vehicles in the future. There are 17 Mabuhay Lanes implemented by MMDA in Metro Manila. These lanes serve as alternate routes intended for heavy traffic during Christmas Season. Mabuhay lanes include routes from EDSA to specific destinations such as Greenhills in San Juan City, Baclaran in Paranaque City. There are also routes from NLEX to C5 and Manila Area, from Manila area to Cariedo and Divisoria, and from the southern to northern parts of Metro Manila.

The truck ban routes as well as the Mabuhay lanes were plotted in the road network of Metro Manila. There are 4 scenarios considered in the study. These are (1) truck shortest path (TSP) without truck ban and Mabuhay lanes, (2) truck shortest path with Mabuhay lanes (ML), (3) truck shortest path with truck ban (TB), (4) truck shortest path with truck ban and Mabuhay lanes (MLTB).

Shown in figure 12 is the map of the truck shortest path considering without MLTB and with ML while shown in figure 13 is the map of truck shortest path considering with TB and with MTB from zone 6661 in Bacoor, Cavite.
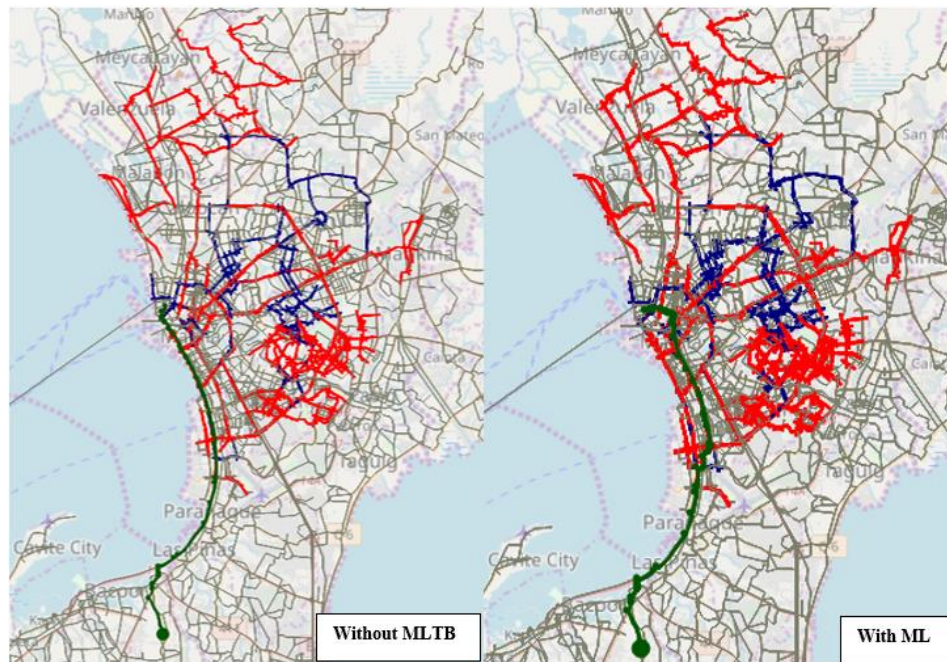
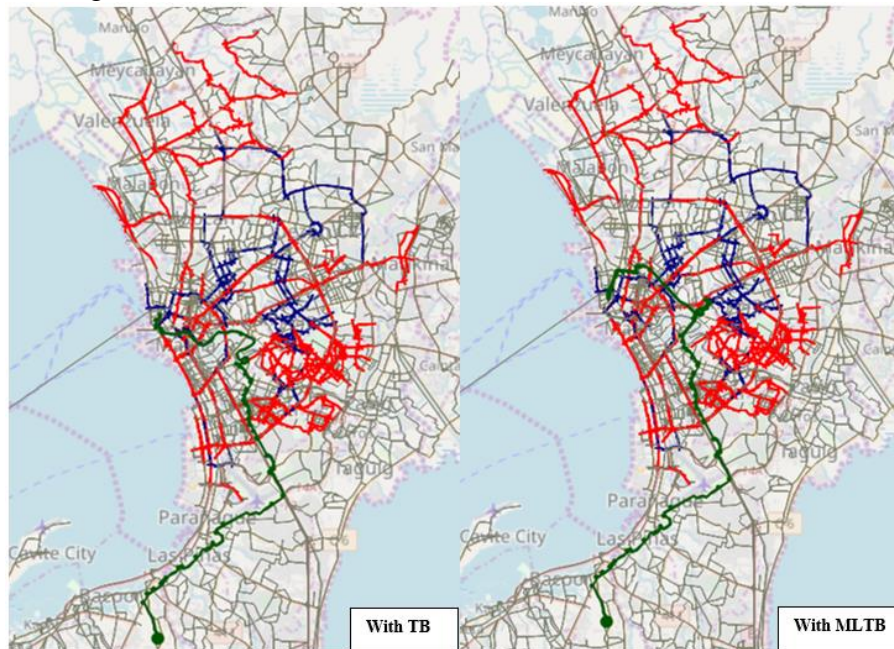Figure 12. TSP without MLTB and with ML from zone 6661

Figure 13. TSP with TB and with MLTB from zone 6661

Another location performed the 4 scenarios is in zone 6662 particularly in Guiginto Bulacan shown in figure 14 and 15, respectively.
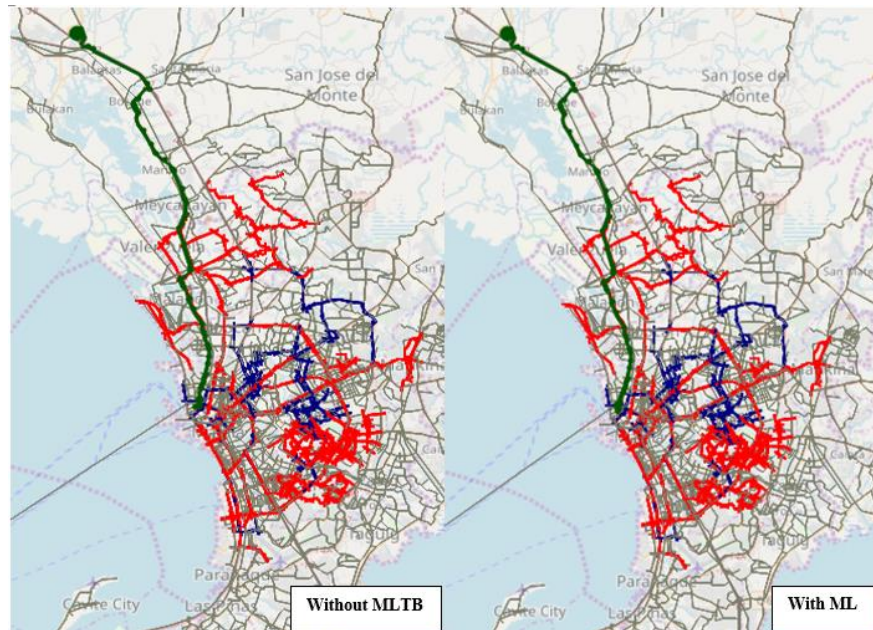
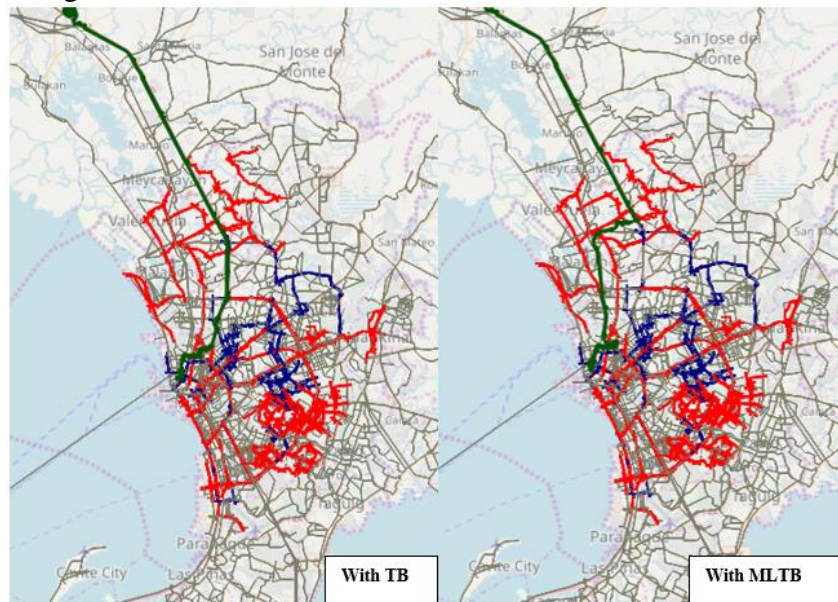Figure 14. TSP without MLTB and with ML from zone 6662

Figure 15. TSP with TB and with MLTB from zone 666

Table 7 shows the results of simulation, the shortest path distance from zone i to the port area of Manila considering 4 scenarios. Based on the results, the travel distance will becomes longer considering mabuhay lanes. It will be longer when truck ban is considered except in zone 326 where the distance is shorter compared to mabuhay lane scenario. The travel distance is further longer when the both truck and mabuhay lanes scenario is considered.

Table 7. Shortest Path distance from Zone i to the port area of Manila (km)

Zone	Without MLTB	With ML	With TB	With MLTB
6661 (Bacoor, Cavite)	21.44	23.08	33.66	37.03
288 (Cavite City)	34.15	35.80	46.99	50.36
6662 (Guiguinto Bulacan)	32.50	32.57	33.73	36.54
326 (San Jose Del Monte)	34.90	37.22	35.03	43.42
352 (Rodriguez, Rizal)	32.38	32.35	34.69	45.22
349 (Antipolo)	27.97	29.05	33.59	40.81
298 (Binan, Laguna)	36.00	36.17	40.59	45.20
342 (Santa Rosa, Laguna)	39.99	40.16	45.55	49.19

5. CONCLUSION AND RECOMMENDATION

There is a significant increase of truck volume observed in circumferential and radial road in Metro Manila for the past 5 years. Congestion in the truck routes were evident based on the long queue of trucks observed on the major thoroughfares and based on the travel time and delay from data logger.

Based on the review of truck policies in Metro Manila, truck ban time were varied and uncoordinated across cities.

Based on the trucking survey, most of the truck current trips are less than 100 km. The average travel time from origin to destination is 4-5 hours with an average speed of 10-15 kph. Most of the truck drivers perceived that mixed traffic post safety hazard and they want to have a separate lane for trucks. They have pre-defined route before they travel and mostly, they do not change route even there were traffic problems along the route. The top 3 problem and issues they raised and need to be improved regarding truck operation in Metro Manila are truck ban/or removal of truck ban, heavy traffic, and need of parking

Based on simulation results, using shortest path method, travel distance of trucks will be longer if mabuhay lanes, truck ban, and both mabuhay lanes and truck ban were considered or applied as traffic scheme.

Based on the findings of the study, it is recommended that the concerned government agency should look into and review the truck ban regulation and one truck lane policy with respect to the effectiveness of these regulations and their impact to truck industry. Also, it is recommended to study the impact of congestion and pollution from trucking operation to the transportation system and general public.

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