

Assessing the Implementation Arrangements for a City Bus Transport System through a Hybrid PPP Model: The Case of the Pasig City Bus Service

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Abstract: The Ortigas Center is an important urban center in Metro Manila where its roads are often congested. Pasig City implemented a free bus service within Ortigas to address the need for public transportation. This Study assessed the implementation arrangements for a free bus service in Ortigas. The Study finds that there is a valid demand for the bus service as Ortigas is a key trip generator. However, the present free bus service is not financially viable. The Study shows that a fleet size fitted for demand will be more efficient than the current service. The Study finds that a Hybrid PPP Model for the bus service is more viable than a Pure PPP Model and the current arrangements. Both PPP Models will require the same institutional requirements such as a PPP Ordinance, the setting-up of a PPP Committee, and processes consistent with the awarding of local government contracts.

Keywords: Local Public Transport Route Planning, Viability Assessment, PPP Bus Service

1. INTRODUCTION

Pasig is a city in the Philippines located along the eastern border of Metro Manila. It is primarily residential and industrial, but has been becoming increasingly commercial in recent years, particularly after the construction of the Ortigas Center Business District (CBD) in its west. To this end, issues such as low level of efficiency of the public transport within Ortigas Center emerged. This was one of the findings from the Study of Pasig City Land Use and Transport Study commissioned by Pasig LGU. To improve this, the city government, in cooperation with Ortigas Center Association Inc., Association of Building Managers, the Department of Environment and Natural Resources and the Department of Transportation, has launched a free bus service to ferry commuters around the center and to reduce the number of cars on the road and provide cleaner air.

This free bus service started its operation last June 22, 2016. To date, there are eight 25-seater bus that will ply specific routes and stops within Ortigas Center. Each bus is equipped with CCTV cameras, GPS connectivity and also use Euro IV fuel standards, in line with the Clean Air Act. This buses currently operate during rush hour on weekdays, from 6am to 9am, 12pm to 2pm, and 4pm to 7pm.

The Government estimates that economic loss due to traffic congestion in Metro Manila amounts to of Php 3.5 Billion per day. This is particularly true in the Pasig-Ortigas Corridor and Ortigas Central Business District, which are both considered as traffic congestion hotspots.

Continuing economic growth will mean that the car volume will increase, as well as the demand for public transportation. As such, it can be expected that traffic congestion is likely to continue resulting to economic loss due to loss of time, and increased vehicle operating costs. Hence, there is a need to define a more robust public transport system to able to accommodate the dynamics of travel demand. The free bus service in Pasig City is one way of addressing this problem. However, there will be sustainability and reliability issue for lack of revenue mechanism that can be used for expansion, and a proper operations and maintenance.

2. OBJECTIVE AND SCOPE

It is in the context of the abovementioned considerations that this Research is being made. The main objective of the Study is to assess the present implementation arrangements for the Pasig Free Bus Service referenced from the Local Public Transport Route Planning (LPTRP) Manual Operational Parameters for Public Transport Services.

There are resource and time constraints in any research endeavor. The Study thus is limited to the following scope: (i) Focus on Pasig City Central Business District as study area; (ii) Simplified Forecast and Financial Model; and (iii) Route Focus: North-South Route and West-East Route.

3. CONCEPTUAL FRAMEWORK

The Conceptual Framework of the Study is shown in the Figure below. It is a three-stage framework where each stage contributes to succeeding ones. The first framework involves the cyclical relationship of land use and transportation. A land that involves an economic activity will result to a demand for travel. This will in turn increase the accessibility of the land, which will cycle back to the increase of travel demand.

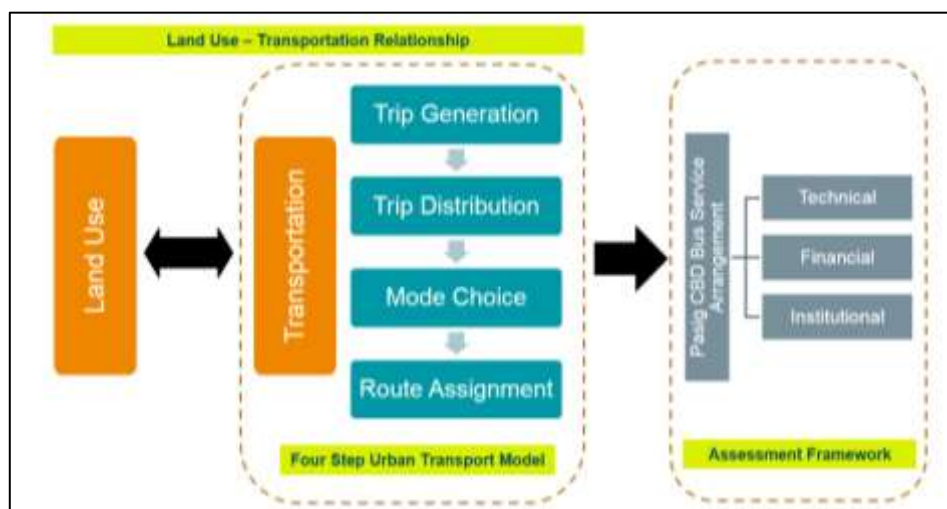


Figure 1. Conceptual Framework

The resulting travel demand is an input to the Four-Step Urban Transport Model, which will ultimately produce trips that are expected for the Pasig Bus Service. Trip Generation will answer how many trips are produced and attracted to and from the study areas. Trip Distribution will show how many trips are going from one zone to another, and within zones. Mode Choice will determine what particular transport modes the generated trips take. And finally, Route Assignment will say what routes will the transport modes take.

The generated trips using public transport mode is the potential demand that the Pasig Bus Service will accommodate. At this last stage, the objective is to analyze the technical, financial, and institutional viability of the Service in reference to the service parameters of the Local Public Transport Route Planning (LPTRP) Manual that was jointly issued by the Department of Transportation (DOTR), Department of the Interior and Local Government (DILG), and the Land Transportation Franchising and Regulatory Board (LTFRB).

4. REVIEW OF RELATED LITERATURE

With the influx of road users especially in the Ortigas Center in Pasig City, what has been problematic is the mobility of people. This attracts attention from researchers to focus on the city as a study area and to introduce high-capacity public transport options to commuters. Around the globe, buses play significant role in providing high-capacity public transport options to commuters. Different bus services have been created to provide specific purpose. For example, in Hampshire County, United Kingdom, 30% of all public buses are funded by the local government while 70% are run privately by private companies. Numerous studies recorded that quality of service greatly affects the overall performance of public transport system. For areas accessible by buses, factors which influence public ridership like service reliability, safety, comfort, and cleanliness may require performance improvements to motivate people to switch from private to public transport system.

In terms of local literature, the ADB-funded study, TA-8195 PHI: Davao Sustainable Urban Transport conducted by Halcrow and TTPI (2013) discussed about sustainable urban transportation particularly franchising and financial requirements. Although the practice in public transport service is that private sector used to plan and deliver routes and modes while the government thru LTFRB responding to private sector's request, the Study suggested for "public-private partnership" platform in which public sector becomes responsible for setting overall transport policy, planning network coverage, service level and standard and providing supporting infrastructure while the private sector is focused on providing and operating vehicle fleet. The study further discussed four possible inclusion in public transport reform program, such as: (1) Build-Operate-Transfer, (2) separate provision of infrastructure and operations, (3) active LGU involvement in network planning and management and (4) LGU involvement in providing operations.

On literature regarding route measure capacity (RMC) in the assessment of public transportation. Manresa et al (2015) described how the current formula RMC is used as the policy instrument in determining public need of new or additional units for franchises of public transport. The paper discussed the current use and future prospects for the formulas including the need to come up with a network-based approach in determining the number of vehicles required to serve the estimated passenger demand. On the other hand, Carreon and Florendo (2013) applied the RMC formula in determining total passenger demand for the UP Campus – Katipunan public transport route in Quezon City, the biggest city in Metro Manila. Likewise, Mendoza and San Diego utilized the same RMC method for EDSA, the main arterial corridor of Metro Manila. They concluded that there is a 75% oversupply of buses in EDSA. Lastly, Doroy, Lidasan, et. al. (2017) proposed alternate methods to determine the

appropriate route capacity for public transportation modes. And one of the more promising methods is the use of land use and trip generation as a determinant for public transportation fleet size requirements.

Lastly, there are two transport studies focused on land use and road transport of Pasig City. In 2011, the Pasig City Central Business District (CBD) Land Use and Transport Study (Transport and Traffic Planners, Inc. & UP PLANADES) discussed the Pasig City’s current land use, traffic situation, public transport condition environmental improvement and disaster preparedness, travel demand forecast as well as recommended project measures. In 2013, the Public Transport Service Improvement for the Pasig Central Business District (Transport and Traffic Planners, Inc.) gave details on the priority recommended project measures for Pasig CBD including demand responsive traffic signal system and the introduction of environmentally sustainable public transport system for intra-CBD and inter-CBD transport connectivity using appropriate low carbon vehicle technologies. This is where the existing and operational Pasig free bus service stemmed.

5. RESEARCH METHODOLOGY

The Research used standard methodologies in transportation science and viability assessment to accomplish its objectives. The Figure below summarizes the Research Methodology. The Study undertook a disaggregation of the Four-Step Model (i.e. OD Matrix) that was developed under the MUCEP. The Study conducted two surveys – boarding and alighting; and travel time and speed – to validate the ridership estimate that came from the OD Matrix. For the Financial Viability, the standard capital budgeting technique was utilized to arrive at common financial viability indicators – net present value (NPV), and Internal Rate of Return (IRR). In terms of the Institutional Assessment, the Study interviewed Key Informants from the Pasig LGU and the DOTR. A review of the literature on the implementation, management and regulation of the public transportation system as well as existing transport and land use studies for Pasig City was also made to round up the assessment of institutional arrangements that may be ideal for the Pasig Bus Service.

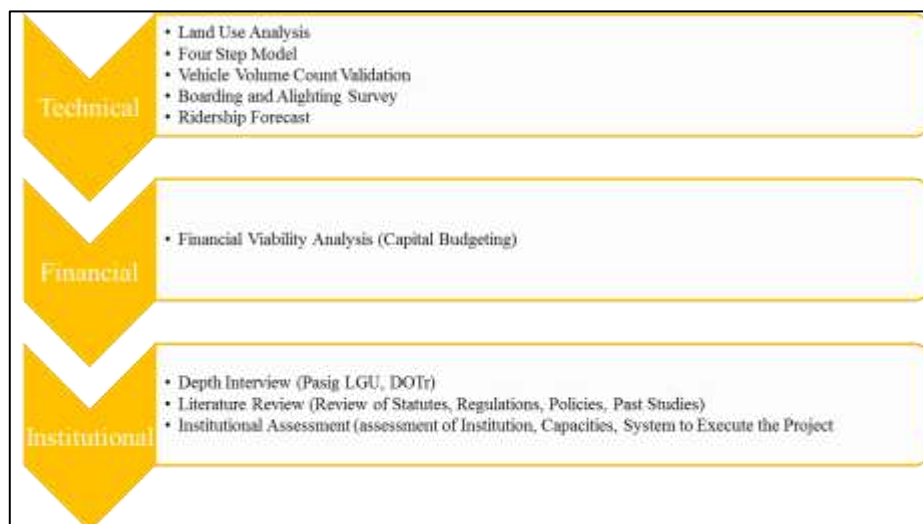


Figure 2. Research Methodology

6. STUDY AREA

Pasig City has a total land area of 3,146 hectares situated in the eastern border of Metro Manila. In 2015, Pasig City has a population of 755,300 distributed in 30 barangays. 20% of the City's total population resides in Pinagbuhatan while 12% are in Manggahan. Average population density is 23,690 per km², with Pinagbuhatan being the most densely populated, followed by Santo Tomas, Santa Cruz and Palatiw. The current land use of the Ortigas Center is a mixture of residential-commercial-institutional. The estimated Gross Floor Area (GFA) is 7,067,042 sq.m. and around 47% of it is being used as residential space while 44% is used for commercial and office purposes. The Figure below shows the land use map of the Ortigas Business District.

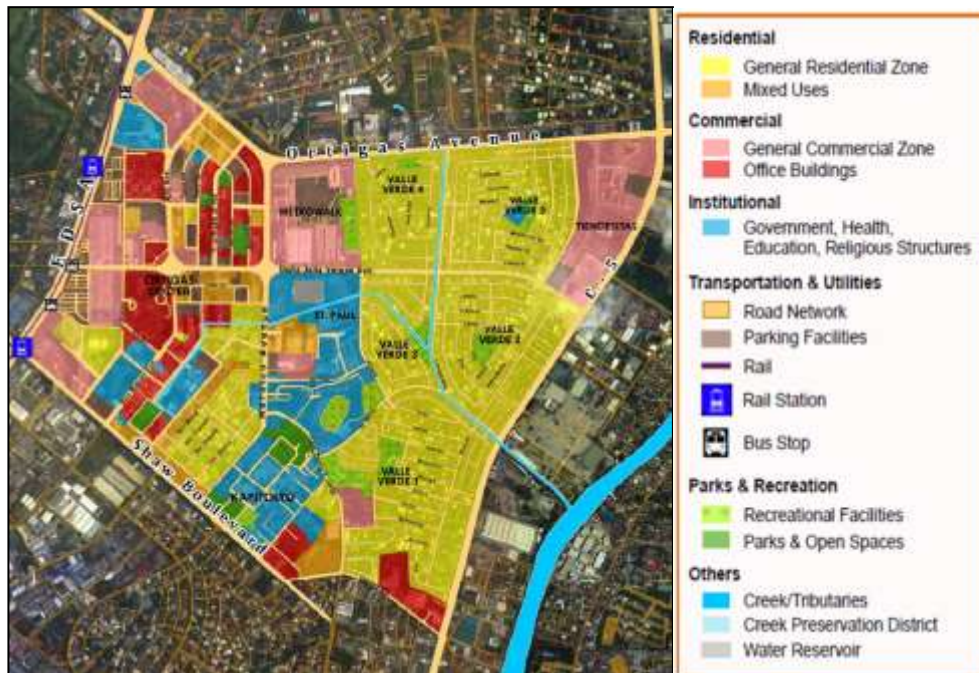


Figure 3. Current Land Use of Pasig City

Public transport for external and internal trips in Pasig City are abundant. MRT line 3 is situated in the western side of Ortigas Center (Ortigas Station and Shaw Station), connecting the area from North Avenue, Quezon City to Taft Avenue in Pasay City and traversing the stretch of EDSA. City and provincial buses also ply along EDSA. Point to point buses (P2P) are also operational with terminals at Mega Mall going to North EDSA and Clark. Ortigas buses operating along Ortigas Avenue are also present with routes going to/from Quiapo in Manila and Cainta and Taytay in Rizal. Public utility jeepneys (PUJs) and Asian utility vehicles (AUVs) are also available in the area. PUJs are concentrated along Shaw Boulevard and Ortigas Avenue, with routes to/from Rizal province, Quiapo, Sta. Mesa and San Juan. Inter-city PUJs service EDSA-Ugong, with terminus at Mayflower St (Mandaluyong City), Robinsons EDSA- Ortigas Complex, with terminus at Robinsons Galleria and EDSA Shaw - Ortigas Complex route, with informal terminus at corner of EDSA Shaw and San Miguel Avenue. On the other hand, AUVs cover the eastern part of Pasig City, Marikina, Makati, Greenhills, Eastwood and Rizal Province. The main terminals of AUVs within Ortigas Center are in SM Megamall (St. Francis Avenue) and Robinsons Ortigas (EDSA). There are also few AUVs running within Ortigas Center at certain periods with route following Robinsons Galleria, SM Megamall and Tektite towers, but these have no legal franchise from LTFRB.

Recently, Pasig City Government installed physical separation facilities to protect bikers or cyclists at the stretch of Dona Julia Vargas Avenue and F. Ortigas Jr. Road, both within Ortigas Center, Pasig City. This is based on the Pasig LGU-approved "Bicycle

Transportation Promotion Ordinance” in a bid of the city to promote biking as an environment-friendly commuting option.

7. MAJOR FINDINGS

7.1. Survey Results

There used to be four routes that the Pasig Bus Service provides in the Ortigas Business District. These routes have been reduced into essentially two routes to maximize the utilization of the existing fleet. These routes are shown in the Figure below, and mostly follows the North-South, and East-West Axis of the Ortigas Business District. The Red Route generally circulates around Ortigas Avenue and Julia Vargas Avenue with terminus at Robinson’s Galleria Mall, and Tiendesitas. The Yellow and Green Routes principally follows Meralco Avenue coming from Robinson’s Galleria Mall and terminating at Shaw Boulevard, with the exception that the Green Route follows a spur around Barangay Oranbo. For purposes of this Study, these routes are the subject of technical and financial viability analysis.



Code	Routes	Operational Period
Red	EDSA (Robinsons Galleria), Ortigas Avenue, Frontera Drive, Julia Vargas Ave., ADB Avenue, Robinsons Service Road	6am-9am, 4pm -6pm
Yellow	EDSA (Robinsons Galleria), Ortigas Avenue, ADB Avenue, Julia Vargas, Meralco Ave., Shaw Blvd., West Capitol Drive, United St., Pioneer Street, Shaw Blvd., Meralco Ave, Julia Vargas Ave., ADB Ave, Robinsons Galleria	6am-9am, 4pm -6pm
Green	EDSA (Robinsons Galleria), Ortigas Avenue, ADB Avenue, Julia Vargas, Meralco Ave., Shaw Blvd., West Capitol Drive, United St., Pioneer Street, Shaw Blvd., Camino Verde Road, Capt Henry P. Javier, Meralco Ave, Julia Vargas Ave., ADB Ave, Robinsons Galleria	6am-9am, 4pm -6pm

Figure 4. Pasig Bus Service Red, Yellow & Green Routes & Operational Period (Recent)

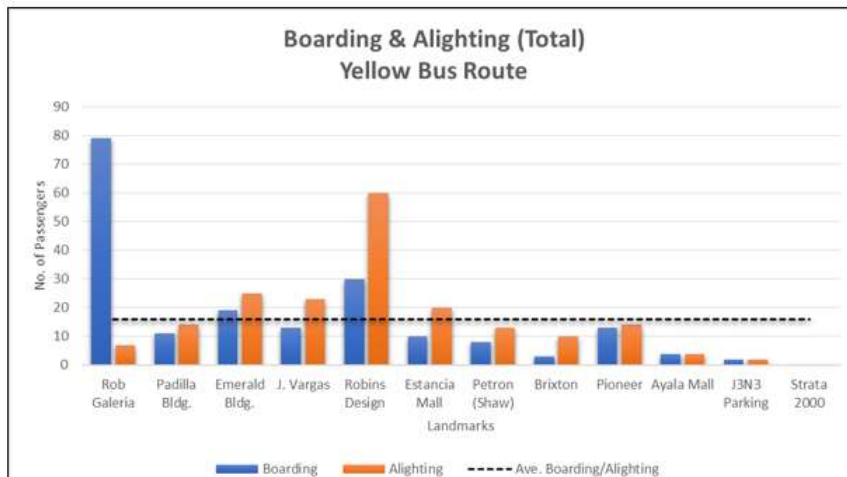
The results of the license plate survey are shown in the Table below. An average of three to four buses plies through the subject routes. Bus A (green) and C (blue) have mechanical problems, despite being relatively new (2 years old) while Bus D (Yellow) and Bus G (blue) have special assignment for Pasig City Hall activities. Bus B has only 1 trip in the afternoon (with special trip after trip).

The results of the boarding and alighting survey are shown in the Figures below. The average boarding and alighting passengers for the Red Route is 35 with a peak of 93 passengers. The Yellow Route has an average of 17 boarding and alighting passengers with a

peak of 80 passengers. Finally, the average boarding and alighting passengers for the Green Route is 17 with a peak of 106 passengers.

Table 1. Results of the License Plate Survey

AM Peak					PM Peak				
Time	License Plate	Bus Color	Bus Code	No. of Trips (Loop)	Time	License Plate	Bus Color	Bus Code	No. of Trips (Loop)
6:05am	E-34109	Yellow	H	4	4:11pm	E-34112	Red	B	1**
6:07am	E-34112	Red	B	3	4:14pm	E-34109	Yellow	H	2
6:10am		Green	E	3	4:20pm		Green	E	2
6:30am	E-34113	Red	F	3	4:41pm	E-34113	Red	F	3



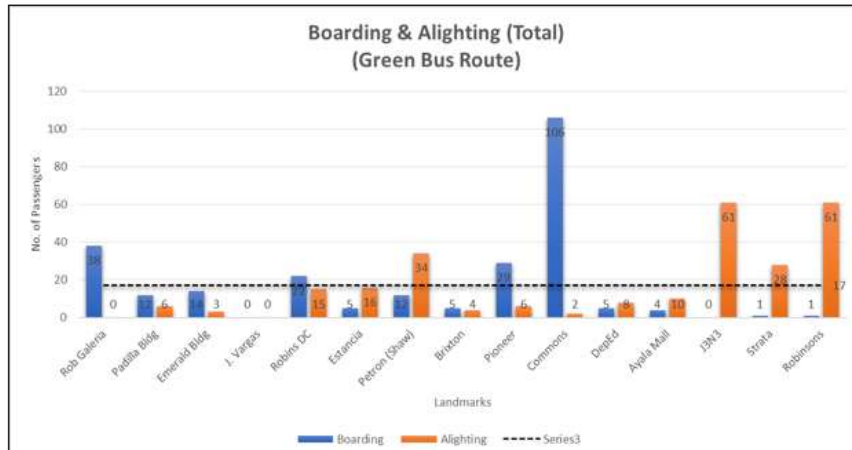
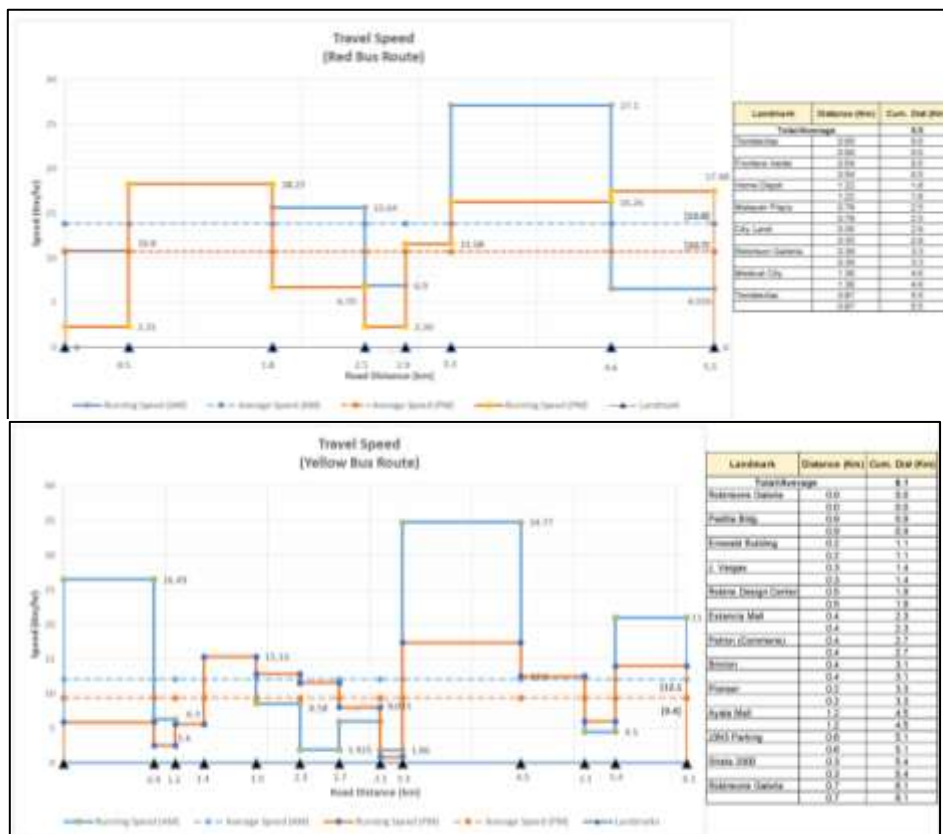


Figure 5. Boarding and Alighting Survey Results – Red, Yellow & Green Route
 The results of the Travel Time Survey are illustrated in the Figures below for the Red, Yellow and Green Routes. The average speed of the Red Route is 13.8 kph in the morning, and 10.7 kph in the afternoon. On the other hand, the Yellow Route has an average speed of 12.1 kph and 9.4 kph for the morning and afternoon runs, respectively. Finally, the average speed of the Green Route is 12.9 kph in the morning, and 12.1 kph in the afternoon. In general, average speeds are higher in the morning than in the afternoon.



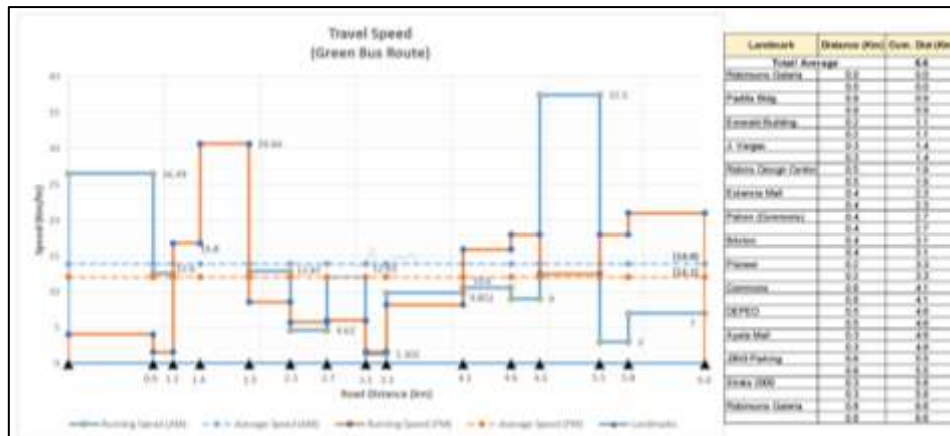


Figure 6. Travel Time Survey Results – Green Route

7.2. Travel Demand

The passenger volume of the Pasig Bus Service is the travel demand within the zones inside the Ortigas Business District, which are Barangays Ugong, San Antonio, Oranbo, and Kapitolyo. The Table below summarizes the characteristics of these barangays including the zoning code of these areas from the MUCEP Study. The travel demand is disaggregated from the OD Matrix of Metro Manila that was developed by the MUCEP Study.

Table 2. Ortigas Center Base Data

Barangays	2015 MUCEP Zone	2015 Population	Area (Ha.)
Ugong	220	22,266	375.38
San Antonio	221	11,666	82.07
Oranbo	221	4,395	436.61
Kapitolyo	222	10,541	95.24
Total		48,868	989

The travel demand for the Study area totals to 10,801 daily trips (internal) with 4,051 trips using public transport, and 6,750 trips using private cars, as shown in the Table below. It is assumed that the Pasig Bus Service can fully accommodate the “Public” trips with the right operational parameters. This assumption may slightly be optimistic. However, it should be noted that this value does not include the possible shift of trips from car users/riders. Thus, any overstatement of the travel demand is an allowance for the diverted car trips.

Table 3. Disaggregated Travel Demand for the Study Area

Public+Private	Ugong	San Antonio / Oranbo	Kapitolyo	Total
Ugong	2,310	368	128	2,806
San Antonio / Oranbo	368	858	1,125	2,351
Kapitolyo	142	1,208	4,294	5,644
Total	2,820	2,434	5,547	10,801
Public	Ugong	San Antonio / Oranbo	Kapitolyo	Total
Ugong	2,052	40	72	2,164
San Antonio / Oranbo	40	168	328	536
Kapitolyo	36	411	904	1,351

Total	2,128	619	1,304	4,051
Private	Ugong	San Antonio / Oranbo	Kapitolyo	Total
Ugong	258	328	56	642
San Antonio / Oranbo	328	690	797	1,815
Kapitolyo	106	797	3,390	4,293
Total	692	1,815	4,243	6,750

The “Public” Trips are increased annually to the forecast years of 2018, 2028 and 2038 to determine the present, mid-term, and long-term passenger volume that may be expected for the Pasig Bus Service. The Table below shows this forecasted passenger volume. The demand in 2018 is 4,338 passengers per day increasing to 5,451 in 2028, and 6,850 by 2038.

Table 4. Forecast Passenger Volume for the Pasig Bus Service

2018	Ugong	San Antonio / Oranbo	Kapitolyo	Total
Ugong	2,198	43	77	2,317
San Antonio / Oranbo	43	180	351	574
Kapitolyo	39	440	968	1,447
Total	2,279	663	1,396	4,338
2028	Ugong	San Antonio / Oranbo	Kapitolyo	Total
Ugong	2,761	54	97	2,912
San Antonio / Oranbo	54	226	441	721
Kapitolyo	48	553	1,216	1,818
Total	2,864	833	1,755	5,451
2038	Ugong	San Antonio / Oranbo	Kapitolyo	Total
Ugong	3,470	68	122	3,659
San Antonio / Oranbo	68	284	555	906
Kapitolyo	61	695	1,529	2,284
Total	3,598	1,047	2,205	6,850

7.3. Fleet Size Computation

The required fleet size (number of units) is computed on the basis of passenger demand as discussed above. The Study follows the methodology recommended by the LPTRP Manual as shown in the Figure below. The passenger demand (PD) is divided by the supply operating parameters such as utilization rate (UR), viable load factor (VLF), average seating capacity

(ASC), and the number of round trips (NRT). The Fleet Size Requirements is computed as the ratio of PD over UR, VLF, ASC and NRT. The total passenger demand for the Red Route is 3,605, and for the Yellow/Green Route is 3,245 by 2038. These PD data are listed in the Table below and serves as the numerator of the LPTRP Manual Fleet Size Formula.

Table 5. Passenger Demand Parameters

Routes	Direction	Barangay	2018 Demand	2038 Demand
Red	North-South	Ugong / San Antonio	2,283	3,605
Yellow / Green	East-West	San Antonio / Oranbo / Kapitolyo	2,055	3,245
Total			4,338	6,850

The supply operating parameters are summarized in the Table below. The average speed and roundtrip time are derived from the results of the Travel Time and Speed Survey. The total cycle time is 99 mins for the Red Route, and 102 minutes for the Yellow/Green Route.

Table 6. Supply Operating Parameters

Routes	Distance (km)	Average Speed (kph)*	Roundtrip Time (mins)*	Layover Time (mins)	Total Cycle Time (mins)	Operating Period (hrs)
Red	6	12	39	60	99	16
Yellow / Green	6	12	42	60	102	16

Hence, the required fleet size for 2018 is 42 buses, and should be increased to 65 buses by 2038 to accommodate the long-term demand (see Table below). The number of round trips for both routes is roughly the same at nine to ten. The Utilization Route is assumed to be 80%, the Viable Load Factor at 70%, and the Average Seating Capacity at 94 (including standing passengers).

Table 7. Fleet Size Parameters

Routes	NRT	UR	VLF	ASC	2018 Fleet Size	2038 Fleet Size
Red	10	0.8	0.7	94	22	34
Yellow / Green	9	0.8	0.7	94	20	31
Total					42	65

The actual and proposed conditions can be compared using the performance parameters recommended in the LPTRP Manual. The Pasig Bus Service falls in the category of Intra-City Route where the vehicle type is a minibus with a seating capacity of 35 excluding standing passengers. To compare, the standard bus, based on the said Manual, has assumed seating capacity of 50 pax. The average speed of minibus is supposed to be 25 kph to 40 kph and a headway of 0.5 min/bus to 5 min/bus. The hourly capacity would be 420 to 4,200 passengers per hour per direction (PPHPD) for a maximum distance of 15 km. The actual condition is thus substandard with reference to the criteria recommended by the Manual. This condition will be improved by increasing the fleet size to 42 buses, which would result to a headway of 5 min/bus, and 1,304 PPHPD.

Table 8. Comparative Performance Parameters

Parameters	Actual (Pasig)	Proposed (2018)	LPTRP Manual Criteria
Vehicle Type	Minibus	Minibus	Minibus
Seat Capacity	94 (seating+standing)	94 (seating+standing)	35 (seating)
Speed (kph)	12	12	25-40
Headway (min/bus)	10-13	5	0.5-5
Hourly Capacity (PPHPD)	272	1,304	420-4,200
Maximum Distance	6	6	15
Fleet Size	7	42	-

7.4. Financial Analysis

The series of tables below show the results of the Financial Analysis made by the Study. The Project Cost is assumed to be Php 320 Million for an ultimate fleet size of 65 buses, and a debt-equity financing mix of 70:30. The Project will include the construction of a depot and control center. Bus stops are excluded as these are already existing. The debt component of the Project will amount to Php 224 Million and the required equity would be Php 96 Million.

Table 9. Estimated Project Cost

Project Cost	Quantity	Unit Cost (PhpM)	Total (PhpM)
Fleet Size	65	3.3	215.06
Depot & Control Center	1	50	50.00
Admin & Management Costs	10%		26.51
Contingency	10%		26.51
Financing Fees	2%		2.78
Total Cost			320.85
Debt Component	70%		224.59
Equity Component	30%		96.25

The Concession Period is assumed to be 20 years. Other assumptions include: Admin and Management Cost Factor at 10%; Contingency Factor at 10%; Financing Fee Rate at 2%; O&M Factor at 5%; Ridership Growth Rate at 2.31%; Average Distance Travelled at 3 km; Base Fare at Php 12 / 5 km; Operating Days at 365 days; Peak Hour Factor at 4.5%; Non-Farebox Revenue Ratio at 10%; Fleet Size at 65 buses; Unit Fleet Size Cost at Php 3.3 Million; Private Sector Interest Rate at 9% per annum; Tenor at 10 years with a Grace Period of 1 year; Tax Rate of 30%; and a Public Sector Interest Rate (PDST-R2) of 6.2% per annum.

The Table below shows the revenue projections estimated for the Project. Annual revenues amount to Php 20.9 Million by Year 1 and will increase to Php 55.4 Million by Year 20. Non-farebox revenues is assumed to be 10% of the farebox revenues, which is fairly conservative as transport services in other countries run as high as 40% of the farebox revenues. The fare is based on the basic bus fare for buses as approved by the LTFRB, which is Php 12 for the first 5 km.

Table 10. Revenue Projections for the Project

Year	1	2	3	4	5	10	15	20
<i>Ridership</i>	4,338	4,438	4,541	4,646	4,753	5,328	5,973	6,695
<i>Fare (Php)</i>	12.00	12.00	12.85	13.24	13.24	15.81	18.33	20.63
Farebox Revenues (PhpM)	19.00	19.44	21.31	22.45	22.97	30.75	39.95	50.41
Non-Farebox Revenues (PhpM)	1.90	1.94	2.13	2.25	2.30	3.07	4.00	5.04

Total Revenues (PhpM)	20.90	21.38	23.44	24.70	25.27	33.82	43.95	55.45
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The expenditure forecast of the Project is estimated in the Table below. Total expenses amount to Php 33.4 Million per year at the start and stabilized at Php 20.49 Million per year at the end of the concession period. The capital expenditures (CAPEX) due to debt financing includes the payment of principal and interest. The expenditures from equity are expected to come from the internal cash flow of the Proponent. The fleet size at opening year is 41 buses and will be re-fleeted to 65 buses by Year 11. Fleet size replacement is expected to be financed through the same debt-equity mix, ten-year tenor, and interest rate.

Table 11. Expenditure Projections for the Project

Year	1	2	3	4	5	10	15	20
O&M	1.05	1.07	1.17	1.23	1.26	1.69	2.20	2.77
Debt CAPEX		26.17	28.42	27.01	25.59	18.53	21.77	17.72
Equity CAPEX	32.43	17.43	17.43				12.87	
Total Expenditures	33.48	44.67	47.02	28.24	26.86	20.22	36.84	20.49

Having the revenue and expenditure forecast in mind, the financial viability of the Project can be estimated. The present conditions would essentially mean that there are no revenue streams for the Pasig Bus Service as fares are not being collected by the City Government. This results to a negative net present value (NPV) of Php 74 Million. This means that the Project is not financially viable at its present arrangements. In contrast, in a pure public-private partnership (PPP) arrangement, the NPV of the Project will be Php 20.2 Million with an internal rate of return (IRR) of 10.65%. As the NPV is greater than zero and that the IRR is greater than the Weighted Average Cost of Capital (WACC) of 8.01%, the Project is deemed to be financially viable using the pure PPP arrangement. In the same breadth, the Project may be implemented as a Hybrid PPP, where the Government constructs the facilities and procures the fleet size requirement, and the Private Sector handles the Operations and Maintenance (O&M) expenditures. In the Hybrid PPP Model, the NPV is greater than zero at Php 58.1 Million, as well as an IRR at 14.00% that is higher than the WACC of 6.64%. The Hybrid PPP Model is more financially viable because the lending rate for the Government is relatively lower at 6.2% than the interest rate of 9% that is available for the Private Sector. The Government can also obtain better concessionary terms of financing such as longer grace period. The Table below shows the Financial Viability Indicators for the Project.

Table 12. Financial Viability of the Project

Parameters	Actual (Pasig)	Pure PPP Model	Hybrid PPP Model	Criteria
NPV	-Php 74.6M	Php 20.2M	Php 58.1M	NPV > 0
IRR		10.65%	14.00%	IRR > WACC
WACC		8.01%	6.64%	

From the point view of the Pasig City Government, as an implementing agency, it can very well afford the financing requirements for the Project. The Table below shows the Income and Expenditure Profile of the City Government. Its average net income is Php 4.5 Billion with no record of debt responsibilities. The Local Government Code (Republic Act No. 7160) mandates that LGUs are only to obtain a debt to a maximum of 20% of its average net income. Hence, either through debt financing or own-source funding, the Pasig City Government has enough fiscal resources to fully implement the Project.

Table 13. Income and Expenditure Profile of Pasig City Government

Year	Total Income (PhpB)	Total Expenditure (PhpB)	Debt Expenditure (PhpB)	Net Income (PhpB)
2014	7.518	4.476	0	3.042
2015	8.547	3.198	0	5.349
2016	9.003	3.652	0	5.351
Average	8.356	3.775	0	4.581
20% Debt Ceiling				0.916

7.5. Institutional Analysis

To implement public transport service, a City needs to have a strong linkage with the various transport authorities as enumerated in the hereunder institutional framework.

Table 14. General Institutional Framework for Transport Development & Operation

CATEGORY	ENTITIES	ROLES AND RESPONSIBILITIES
NATIONAL	DOTr	<ul style="list-style-type: none"> National Transport Policy and Plan
	LTFRB	<ul style="list-style-type: none"> Prescription and regulation of routes, capacities and areas of operation of public land transportation services; Issuance of Certificates of Public Convenience or permits; Fare determination; Promulgation and enforcement of rules and regulations on land transportation public utilities
	LTO	<ul style="list-style-type: none"> Motor Vehicle Registration; Driver Licensing; Enforcement of Land Transport and Traffic Rules, emission standards, and related laws.
	DPWH	<ul style="list-style-type: none"> Planning, design, construction, and maintenance of national roads and bridges, among others
	MMDA	<ul style="list-style-type: none"> Transport and traffic management - formulation, coordination and monitoring of policies, standards, programs and projects to rationalize the existing transport operations, infrastructure requirements, the use of thoroughfares, and promotions of safe and convenient movement of persons and goods; Provision for the mass transport system and the institution of a system to regulate road users; Traffic enforcement operations, traffic engineering services and traffic education programs
Pasig LGU	City Government	<ul style="list-style-type: none"> Comprehensive Land Use Plan Comprehensive Development Plan Transport Facilities Local Public Transport Route Plan Franchise to Tricycles Traffic Management
	Barangay	Parking Management
Private Sector	Public Transport (PT) Provider	Investment on Operation and Maintenance of PT
	Private Sector (OCAI)	Implementation and monitoring of rules and regulations, in cooperation with the local government to improve and safeguard the wellbeing of the membership and public in general, covering the Ortigas Business District.

As regards public transportation, the Department of Transportation is the mandated agency of the government to be the “primary policy, planning, programming, coordinating, implementing, regulating and administrative entity of the Executive Branch of the government in the promotion, development and regulation of dependable and coordinated networks of transportation systems as well as in the fast, safe, efficient and reliable transportation services.” Ergo, it is the planning agency for public transportation as well. It has two (2) sectoral offices which implement its issued policies on land transport, such as the Land Transportation Franchising and Regulatory Board (LTFRB) and the Land

Transportation Office (LTO). LTRFB is mandated to prescribe and regulate routes of service, economically viable capacities and zones or areas of operation of public land transportation services; to issue Certificates of Public Convenience or permits authorizing the operation of public land transportation services; and to determine fares, rates and other related charges, among others, relative to the operation of public land transportation services. LTO is mandated to establish and prescribe rules and regulations for the inspection and registration of land transportation facilities, such as motor vehicle, tri-mobiles; the issuance of licenses to qualified motor vehicle drivers, conductors; the enforcement of laws governing land transportation and for the deputation of appropriate law enforcement agencies, among others.

The Department of Public Works and Highways (DPWH) is the engineering and construction arm of the Government, and responsible for the planning, design, construction and maintenance of national highways, among others. On the other hand, the Metro Manila Development Authority (MMDA) is mandated to provide “transport and traffic management which include the formulation, coordination, and monitoring of policies, standards, programs and projects to rationalize the existing transport operations, infrastructure requirements, the use of thoroughfares, and promotions of safe and convenient movement of persons and goods; provision for the mass transport system and the institution of a system to regulate road users; administration and implementation of all traffic enforcement operations, traffic engineering services and traffic education programs, including the institution of a single ticketing system in Metropolitan Manila.”

Based on the Local Government Code of 1991, the City is mandated to provide all the services and facilities of the municipality and province, and in addition thereto, adequate transportation facilities, among others. Transportation facilities are single or multimodal transportation facilities that provide transportation to the public on a fare basis, including terminals, bus and train stations. Thus, necessarily, though it has local autonomy as provided by the Local Government Code, Pasig City Government (PCG) needs to coordinate its public transportation services with the national agencies, as aforementioned, as the country moves to using transport network analysis in determining transport facilities and services to address the transport demand anywhere and based on the provision of the law. Rightly so, as LGUs are mandated by law to formulate their Comprehensive Land Use Plan and Local Development Plan, among others, it would be to their best interest that they also plan for their Local Public Transport Route Plan, so that their economic activities could be supported by an efficient transport system. Similarly, the Transport Authority should work collaboratively with the local government units and their key stakeholders to identify the best choice of transport systems for their communities.

With the Local Public Transport Route Planning, the local government unit could be guided on the best option for mode of transportation in their locality. Aside from the Omnibus Franchising Guidelines as contained in the DOTr Department Order 2017-011, and the Public Transport Modernization Program, the LGUs can pass resolutions to create a Transport and Traffic Management Office to regulate the traffic and manage intra-city transport services in their areas. The LGUs are also in-charge of the registration and accreditation of tricycles. However, in the case of Pasig, the City Government had embarked on buying environment-friendly minibuses as early as 2015, which became fully operational in June 2016. This transport program of Pasig City was established year earlier than issuance of Omnibus Franchising Guidelines and the Local Public Transport Route Planning Manual of DOTr.

The Department of Transportation has the responsibility of providing capacity building on Local Public Transport Route Planning and Management to the local government units (LGUs), so they can formulate their local public transport route plan (LPTRP). They could

modify routes or create new ones and recommend what modes of public transport units may be opened to meet passengers' needs. The LPTRP will ensure that national highways will be used primarily for high-capacity vehicles, such as buses, while secondary or local roads will be used mainly for public utility jeepneys (PUJs) or Filcabs. There should be no tricycles in national highways and should be only traversing those not served with higher capacity public transport. Motorcycles are prohibited to be used as public transport because of safety concerns.

Based on a previous study, among the most active stakeholders of Pasig City is the Ortigas Center Association Inc. (OCAI, the main role of which is the effective implementation and monitoring of rules and regulations, in cooperation with the local governments of Pasig City, Mandaluyong and Quezon City in improving and safeguarding the wellbeing of the membership and public in general in the Ortigas CBD. It has also implemented several projects to address traffic problems such as the construction of pedestrian walkway at the intersection of St. Francis St. and Dona Juliana Vargas Avenue., installation of pedestrian sidewalks railings along Onyx Road and the de-clogging of drainage along Topaz Road in Ortigas Center. The study also revealed that there is a need to provide loading and unloading zones within Ortigas Centre for the public transport service, more street signage, and multilevel parking, among others. OCAI would also like to promote sustainable transportation in the area.

In Pasig City, a City Transport Development and Management Office has been created to plan and develop its public transport system in the city. But, the study team recommends a review of the organizational structure to better perform its functions in providing an efficient transport facility for the city. There have been several initiatives promoting sustainable transport, such as car-less day, bikeways, greenways, elevated walkways, HOV lanes, and provision of free shuttle service from the old Pasig to Ortigas CBD. The Public Bus Operation of Pasig City is currently being run by the LGU itself, thus, due to some legal nuances, are being provided free of charge. The City would like to level-up the service quality of its bus operation, but at the same time would like to make it a sustainable proposition. Thus, the Study would like to propose this either for a JV Operation, or a PPP arrangement. Planning for transport facilities and infrastructure rests with the national and local transport authorities, unless these are authorized to private sector through a PPP or JV arrangement. Minimum standards for transport service operation is set by LTFRB and LTO, as provided for in their respective mandates. The Table below shows this comparison.

Table 15. Comparison of Hybrid PPP, PPP and JV with Private

RESPONSIBILITIES	OPTION A: HYBRID PPP	OPTION B: PPP	OPTION C: JV WITH PRIVATE
Setting up of transport company	Private	Private	Pasig LGU
Purchase of units	Pasig LGU	Private	Private
Franchise Holder	Private	Private	Pasig LGU-Private JV
Operation and Management	Private	Private	Private
Fare Collection	Private	Private	Private
Repairs and Maintenance	Private	Private	Private
Installation of stops	Pasig LGU	Pasig LGU	Pasig LGU
Maintenance of stops	Private	Private	Private
Transport Facilities (terminals, garages, etc.)	Pasig LGU	Private or Pasig LGU	Pasig LGU

In truth, Options A and C are also PPP arrangements. The difference between a hybrid PPP and pure PPP is the source of funding, where the former makes use of the GAA and ODA for the infrastructure component, and the O&M are detailed in a Concession Agreement between the government and the private sector and financed by the private sector. In Public Transport

Operation, there are constants, which the Bus Operator shall have to deal with in any mode of project implementation. The approval of proposed routes and issuance of franchise rests with the LTFRB. Operation and maintenance rests with the private sector.

Table 16. Advantages and Disadvantages of Various Implementation Options

Categories	Option A: Hybrid PPP	OPTION B: PPP	Option C: JV with Private
Advantages	<ul style="list-style-type: none"> • LGU Pasig finances infrastructure development, civil works, construction, bus fleet; • Private Sector takes care of the operations and maintenance. • Shall be implemented through GPRA (RA 9184) for the procurement of buses • Service Level Performance is the parameter to continuous operation • Maintenance of facilities by O&M provider 	<ul style="list-style-type: none"> • Private Sector finances • Maybe implemented by public bidding or direct negotiation with Swiss Challenge • Pasig LGU retains ownership at the end of the contract. • Private Sector takes care of the operations and maintenance. • Service Level Performance is the parameter to continuous operation • Revenue Collection is Private; Other revenues from allied services is private • Pasig LGU entitled to fixed or percentage of gross revenues • Risk assumed by private sector before transfer to LGU Pasig • Maintenance of facilities by O&M provider 	<ul style="list-style-type: none"> • Pasig equity contribution shall only be <50% of outstanding capital stock of the JV company • Competitive Selection or negotiated agreements • Pasig LGU maintains control on development initiative • Pasig LGU and private entitled to revenues based on equity • Shared costs and responsibilities • Potential for future privatization • Sharing of risks based on equity
Disadvantages	<ul style="list-style-type: none"> • Investment on infrastructure facilities • Fare Collection is Pasig LGU • Need to manage coordination between the builder and O&M provider at the first instance. 	<ul style="list-style-type: none"> • Investment on infrastructure facilities 	<ul style="list-style-type: none"> • Investment on infrastructure facilities and maintenance handled by Pasig LGU

8. CONCLUSION

The Study hopes that its objectives set forth in the beginning will be achieved after data collection and analysis. The Study finds that indeed there is a valid and revenue-making demand for the Pasig Bus Service. This is because the Ortigas Business District remains to be an important urban center in Metro Manila, making it a key generator and attractor of private and public mode trips.

However, the present implementation arrangements for the Pasig Bus Service is not financially viable. Continuing this setup will not be sustainable for the Pasig City Government. This is primarily for the reason of non-collection of fares, for which the Pasig City Government is constrained by regulatory statutes.

The results of the Study show that a full fleet size requirement that is fit-for-purpose for the passenger demand will be more operationally efficient than a service that is operated by the public sector. An adequate fleet size will ensure that the passenger demand is accommodate in a level of service that is dependable and reliable.

In terms of financial viability, the Study finds that a Hybrid PPP Model for the Pasig Bus Service is more viable than a Pure PPP Model, and certainly than an LGU Operation Model. Nevertheless, both Hybrid PPP and Pure PPP Models will require the same degree of institutional requirements such as a PPP Ordinance, the setting-up of a PPP Bids and Awards Committee, and normal processes consistent with the authorization and awarding of contracts by a local government.

The Pasig City Government, by virtue of its good fiscal standing, can verily afford the funding requirements of the Project either through own-source funding or debt-financing. However, it would be much beneficial, prudent and sustainable if Pasig City Government would have partnership with private sector thru any PPP model schemes.

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