



# **The Quality of Service Perception among Public Transport Users in Metro Manila Considering Dominance of Paratransit Modes**

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# Introduction

- Institutional or formal transport includes public transport services often referred to as planned or scheduled transport services
  - Public (or private) companies that provide services according to the regulations defined by the relevant urban transport authority
- Paratransit ('informal' or even 'illegal' transport) operates on the fringe of the institutional transport system, sometimes even taking over as the main component in the system
  - Services that do not fit with the idea of a modern urban public transport system
  - Partially responsible for problems of traffic congestion, pollution and road accidents

# Significance

- Paratransit are critical in the transport system of developing countries as they are available to everyone
  - 76% of public transport trips in Metro Manila is made using paratransit services (Cervero and Golub, 2007)
  - Paratransit services in developing countries continue to evolve (Tangphaisankun, et al., 2009)
- Phun and Yai (2016) provided a comprehensive classification scheme for paratransit services and highlighted sustainability issues
- Need to understand quality of service perceptions among paratransit users

# Paratransit Services

- Characteristics of paratransit services
  - Operated without government subsidy
  - Without exclusive right-of way
  - No fixed route within the city's network
  - No fixed schedule
- Paratransit modes exhibit sub-optimal characteristics
  - Erratic scheduling and service
  - Inadequate investments
  - Inefficient business practices and insurance
  - Lack of capacity
  - Many small operators crowd along line-haul type corridors and still unable to meet the peak demand

# Service Quality Concept

- Service quality is an abstract and elusive construct because of three features unique to services: intangibility, heterogeneity, and inseparability of production and consumption” (Parasuraman et al., 1985; 1988)
- Different definitions of service quality. However, there is agreement that service quality should be assessed by using customer perspective
- Perceived quality studies that try to determine the satisfaction levels of public transport users provide a powerful tool to public transport authorities and operators in creating marketing policies aimed at retaining current users (Dell’Olio, et al., 2010; 2011)

# Objectives

- Explore the quality of service perceptions among paratransit users in Metro Manila
  - Focus on paratransit users with more than two transfers
  - Conduct of pilot public transport quality survey at the University of the Philippines Diliman campus
  - Quality of service measures are developed using exploratory factor analysis(EFA) and structural equations modelling (SEM) approaches

# Past Studies

- Fillone, et al.(2005) developed a structural equation modelling where the assessment of the urban traveler was regarded as the endogenous construct
- Eboli and Mazulla (2007) formulated a structural equation model to explore the impact of the relationship between global customer satisfaction and service quality attributes
  - 16 service attributes evaluated by the user sample and 2 global service quality indicators (i.e., perceived and expected quality)
  - The latent variables with a major effect on global customer satisfaction are service planning and reliability
  - The network design and the comfort and other factors latent variables also have considerable impacts

# Past Studies

- Eboli, et al. (2013) used structural equation model approach to reveal the unobserved latent aspects describing the service and the relationship of these aspects with the Overall Service Quality
  - In analyzing service quality of public transport, two passengers' statements about the overall service quality were gathered: the first one when passengers have not reflected on the attributes describing the service, and the second one after they have thought about them
  - The unobserved latent construct obtaining the highest weight on overall service quality is service, while comfort and personnel have little influence
  - The passengers' evaluation better explaining the overall service quality is the evaluation made when passengers have reflected on the service
- Mahatma, et al. (2013) developed a model of service quality which is compatible for public land transport services in Indonesia which consists of four dimensions with 18 indicators
  - The four dimensions are comfort, tangible, personnel, and reliability

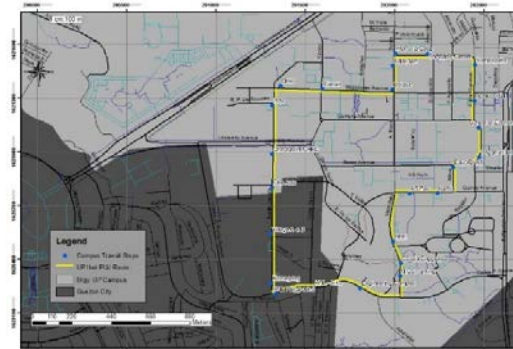
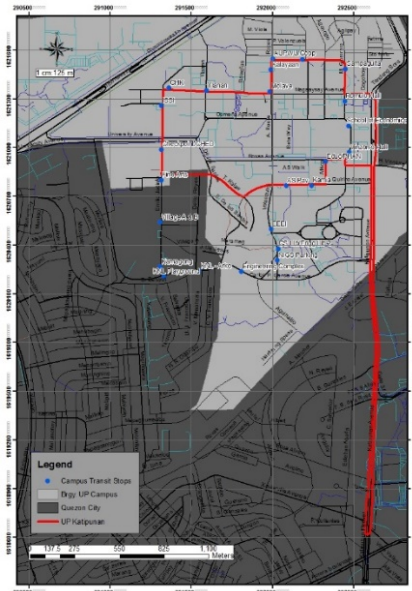


# Pilot Public Transport Quality Survey

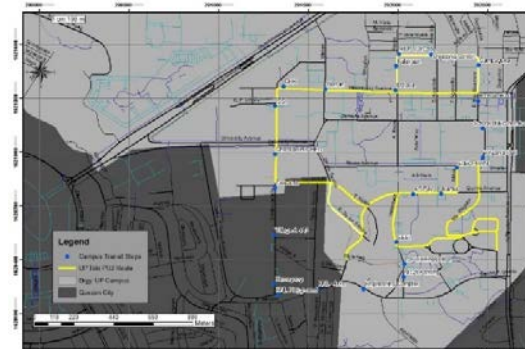
- Conducted at the University of the Philippines Diliman
  - Country's national university with 27 degree-granting units on campus, accounting for 22,765 students and 1,531 faculty members in 2017
  - Has a total land area of 493 hectares (1,220 acres)
  - Referred to as Diliman Republic and a "microcosm of the Philippine society"
- UP Diliman campus has its own Public Utility Jeepney (PUB) service
  - 2 circular routes (UP "Ikot" and "Toki")
  - 4 other routes serving the campus



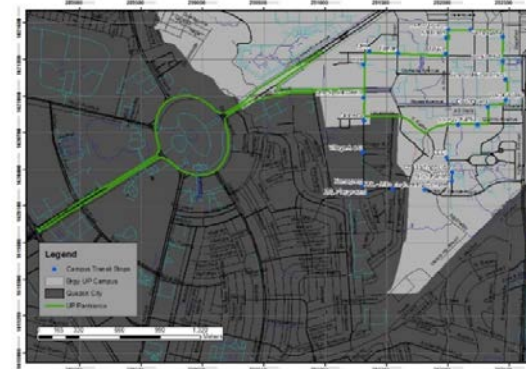
# Routes in UP Diliman



a) UP Ikot



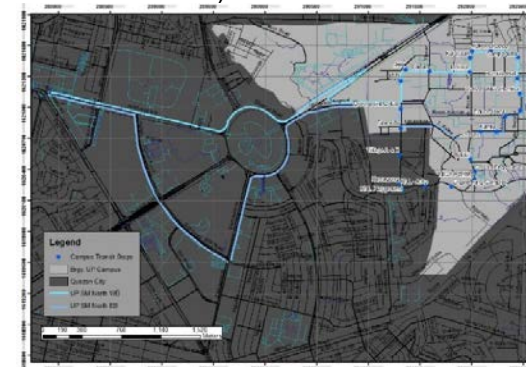
b) UP Toki



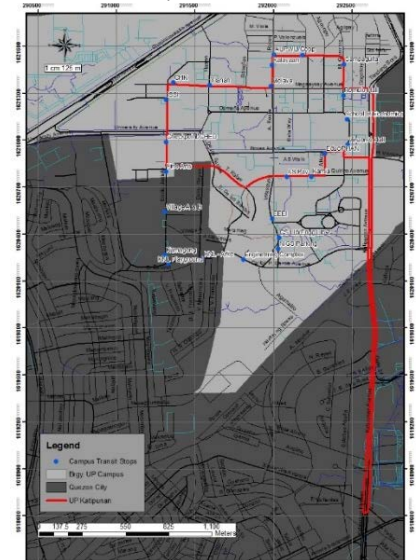
c) UP Pantranco



d) UP Philcoa



e) UP SM North



f) UP Katipunan

	Route Length (in km)	No. of Authorized Units
b) UP Toki	5.32	56
c) UP Pantranco	8.5	15
d) UP Philcoa	11.5	90
e) UP SM North	7.11	43
f) UP Katipunan	13.8	40
	8.45	80

# Survey Design

- Section 1 introduces the research objectives, usage of data some introductory questions regarding their travelling behaviors in UP Campus
- Section 2 asked respondents to recall of their previous trip to UP and to log them in the trip diary. All trips including their trips from their place of residence to UP Campus, within the UP Diliman Campus, and their trip back to their place of residence, was logged. Additional details such as the time of the trips, purpose of the trip, trip mode and fare were also collected
- Section 3 asked respondents to assess the UP Diliman Jeepneys on their perception of the quality of service. Questions are asked regarding their perception of the quality based on:
  - a) UP Jeepney Vehicles
  - b) Experience with the Journey
  - c) Payments
  - d) Driver
  - e) General Condition of Stops
  - f) Accessible Information
  - g) Reliability and Availability

There is a total of 37 different questions in this survey answerable in a Likert Scale of from Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree.

- Section 4 presented the respondents with some basic demographic questions regarding their monthly incomes, daily transportation expenses, age, and household and car ownership information.



# Survey Data

Distribution of Inbound and Outbound Trips by Mode

Mode	Inbound		Outbound	
	Trips	% share	Trips	% share
Walking	38	7.1%	59	10.9%
Biking	2	0.4%	1	0.2%
Own Car	120	22.4%	114	21.0%
Carpool	25	4.7%	52	9.6%
Tricycle	42	7.8%	19	3.5%
Taxi	12	2.2%	9	1.7%
TNVS	33	6.2%	31	5.7%
Train	2	0.4%	0	0.0%
Own Motorcycle	1	0.2%	1	0.2%
Jeepney	202	37.7%	209	38.5%
UV/FX	25	4.7%	19	3.5%
Bus	33	6.2%	28	5.2%
Other	1	0.2%	1	0.2%
	536	100.0%	543	100.0%

- Sample size of 542 students; 3,857 trips logged during the Trip Diary survey
  - 1,677 trips are made inside UP Diliman Campus; 1,079 are made outside UP Diliman Campus (536 are inbound trips and 543 are outbound); The rest are trips made outside of the campus
- Easily half of the trips are made by paratransit modes

# Survey Data

Distribution of Number of Transfers

Number of Transfers	Frequency	% Total
0	78	14.4%
1	220	40.5%
2	121	22.3%
3	66	12.2%
4	35	6.4%
above 5	23	4.2%
Total	543	100.0%

- Almost half of the total respondents are made by paratransit users (i.e. more than 2 transfers)
- Pattern is quite typical in Metro Manila

# Exploratory Factor Analysis (EFA)

## KMO and Bartlett's Test of Sphericity

Indicator		Value
Kaiser-Meyer-Olkin measure of sampling adequacy (KMO)		0.891
Bartlett's test of sphericity	Approx. Chi Square	3476.637
	df	528
	p-value	0.00

- The Kaiser-Meyer-Olkin measure of 0.891 indicates that factor analysis is suitable
- The Bartlett test of sphericity of 0.00 also indicates that the variables are suitable for factor analysis

## Factor Loadings

Variable	Factor						
	1	2	3	4	5	6	7
Seating Condition (v2)	0.409						
Ease of Entry/Exit (v3)	0.555						
Personal Space (v4)	0.550						
Cleanliness (v5)	0.497						
Emission (v6)	0.590						
Ambient Noise (v7)	0.673						
Inside Noise (v8)	0.597						
Inside Temperature (v9)	0.526						
Travel Time (v10)							
Desirable Route (v11)							0.553
Smooth Travel (v12)							0.433
Safe Travel (v13)		0.439					
Easy Payment (v14)		0.475					
Affordable Fare (v15)							
Driver Respects Passengers (v16)		0.517					
Driver Skills (v17)		0.655					
Driver Follow Rules (v18)		0.703					
Driver Respects Others (v19)		0.701					
Stops Visible (v20)				0.649			
Stops Safe (v21)				0.442			
Stops Accessible (v22)				0.692			
Stops Accessible to PWD (v23)				0.441			
Stops Known (v24)				0.681			
Route Information (v25)					0.418		
Operator Information (v26)					0.641		
Jeepney Information (v27)					0.641		
Weekday Availability (v28)						0.756	
Weekend Availability (v29)							
Daytime Availability (v30)						0.650	
Nighttime Availability (v31)			0.540				
Short Waiting Time (v32)			0.842				
Frequent Arrival (v33)			0.674				
Sufficient Capacity (v34)			0.444				

# Quality Factors

- **Factor 1 (Vehicle Condition)** relates to the overall condition of the jeepney vehicle
- **Factor 2 (Ride Comfort)** captures the overall riding comfort of the travel. Interestingly, this factor lumps variables that measure the journey and payment experience, as well as, the characteristics of the driver
- **Factor 3 (Service Adequacy)** captures the overall service adequacy in terms of nighttime availability, short waiting time, frequency of arrival and vehicle capacity
- **Factor 4 (Stops Accessibility)** relates to the visibility, safety and accessibility of the stops
- **Factor 5 (Information Provision)** captures the level of information provision concerning the route, operator and jeepney
- **Factor 6 (Service Availability)** captures the level of availability of the service during weekday and daytime periods (this factor is expected as the users of the service are students who attend their classes during such periods)
- **Factor 7 (Route Connectivity)** captures the level of connectivity of the route in terms of route desirability and smoothness of travel.

Factor	Description/ Variables
Factor 1	Vehicle Condition
	Seating Condition
	Ease of Entry/Exit
	Personal Space
	Cleanliness
	Emission
	Ambient Noise
	Inside Noise
Factor 2	Inside Temperature
	Ride Comfort
	Safe Travel
	Easy Payment
	Driver Respects Passengers
	Driver Skills
	Driver Follow Rules
	Driver Respects Others
Factor 3	Service Adequacy
	Nighttime Availability
	Short Waiting Time
	Frequent Arrival
	Sufficient Capacity
Factor 4	Stops Accessibility
	Stops Visible
	Stops Safe
	Stops Accessible
	Stops Accessible to PWD
	Stops Known
Factor 5	Information Provision
	Route Information
	Operator Information
	Jeepney Information
Factor 6	Service Availability
	Weekday availability
	Daytime availability
Factor 7	Route Connectivity
	Desirable Route
	Smooth Travel

# Structural Equations Model

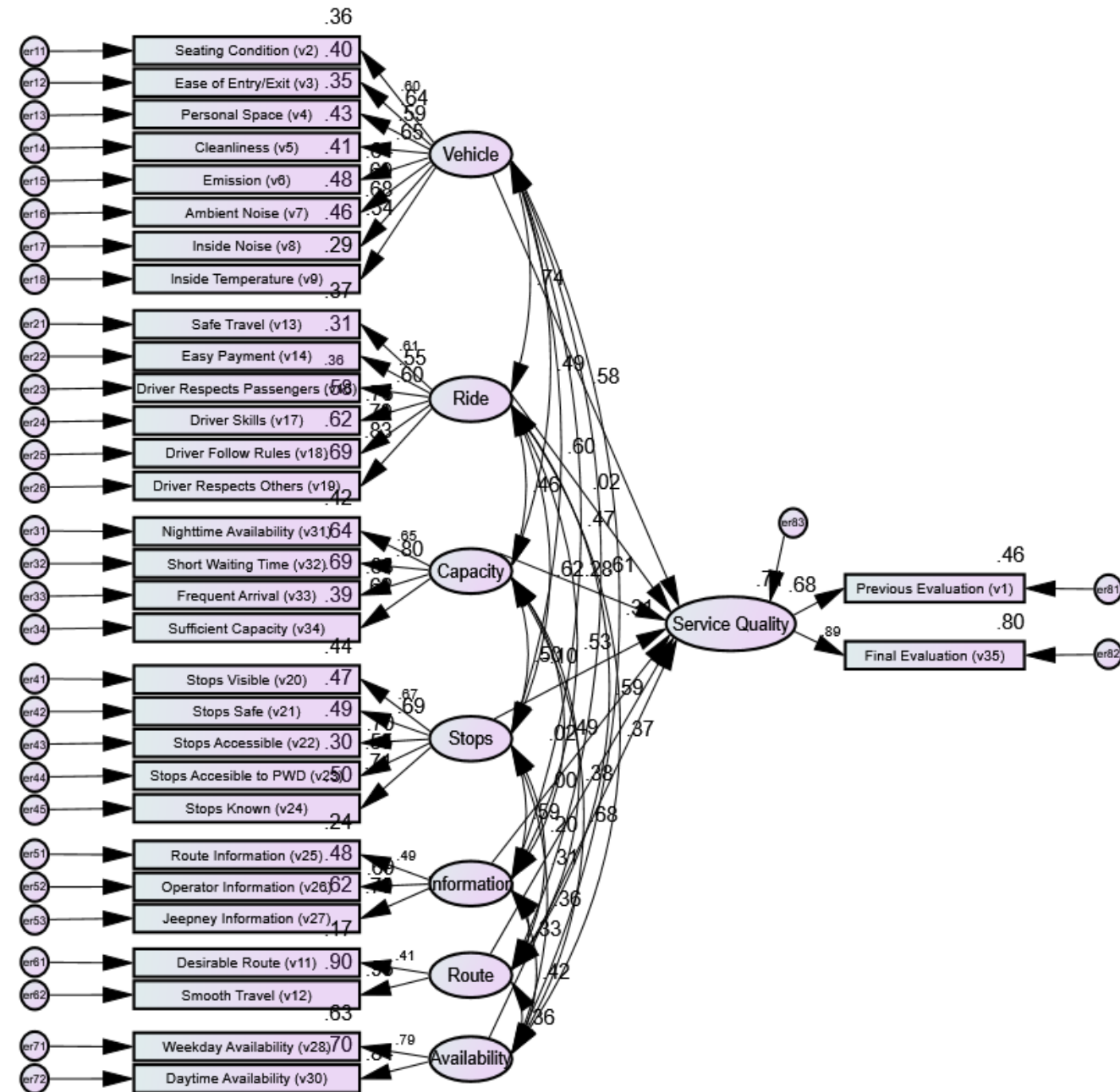
## Goodness-of-Fit Measures

Absolute Fit Indices	
Chi-square/df	1.736
Goodness of fit index (GFI)	0.825
Root mean square error of approximation (RMSEA)	0.055
Incremental Fit Indices	
Normed Fit Index (NFI)	0.772
Tucker-Lewis Index (TLI)	0.873
Comparative Fit Index (CFI)	0.887
Parsimony Fit Indices	
Adjusted goodness of fit index (AGFI)	0.793
Parsimony Normed Fit index (PNFI)	0.690

## Standardized Factor Loading of the Constructs

Constructs	Standardized Factor Loadings
Vehicle Condition	0.581
Ride Comfort	0.022
Service Adequacy	0.282
Stops Accessibility	-0.097
Information Provision	0.021
Service Availability	0.197
Route Connectivity	-0.005

The top 3 constructs that has most effect on Service Quality are: Vehicle Condition, Service Adequacy and Service Availability





# Discussion

- Pilot study produced acceptable models for evaluating the quality of service perceptions among paratransit users
  - A total of seven (7) exogenous constructs were identified and measured that explain the commuters' perception of paratransit quality of service
  - Findings can be generalized to a larger area and provide practical implications for public transport planning and policy for the greater metropolitan area
- Further work on developing a quality of service index specifically for paratransit service and discrete choice modelling of preferences among paratransit users
- Take into account the local context from both the users' and operators' perspective

Thank you!