

XIII
CCTT
2019

XIII CONGRESO COLOMBIANO DE TRANSPORTE Y TRÁNSITO

CARTAGENA DE INDIAS

Mapa cognitivo peatonal sobre la calidad de servicio percibida en aceras urbanas

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Cartagena de Indias, Colombia
26-28 de Junio de 2019
Organizadores



- El nivel de servicio (LOS) es una estratificación cualitativa utilizada para evaluar el desempeño de una infraestructura de transporte en términos de calidad de servicio (Roess and Prassas, 2014)
- El LOS fue inicialmente desarrollado para evaluar infraestructura de transporte para vehículos motorizados y fue tomado como base para proponer una versión de peatones (PLOS)

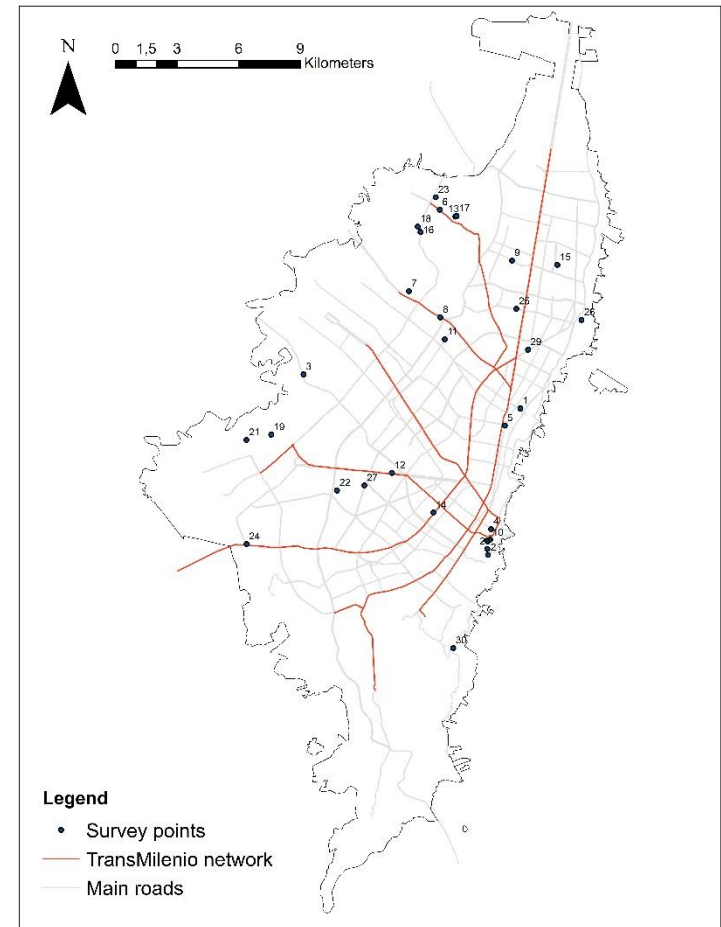
- El método para determinar el PLOS fue inicialmente propuesto en la década de los 70 (Fruin, 1971)
- Los datos de entrada para utilizar esta metodología solo incluyen variables objetivas de la relación flujo-capacidad (p. ej., ancho acera, flujo peatonal) (Roess and Prassas, 2014)

Revisión de Literatura

Periodo	Autores principales	Flujo	Geometría	Entorno	Factores ambientales	Percepción	Integración urbana	Estructura poblacional
1970 - 1979	(Fruin, 1971)	✓	✓					
1980 - 1989	(Polus, Schofer, & Ushpiz, 1983; HCM, 1985; Mori & Tsukaguchi, 1987; Tanaboriboon & Guyano, 1989)	✓	✓					
1990 - 1999	(Mozer, 1994; Jaskiewicz, 1999)	✓	✓	✓				
2000 - 2004	(HCM, 2000; Gallin, 2001; Landis et al, 2001; Pikora et al, 2003; Sarkar, 2003)	✓	✓	✓	✓	✓		
2005 - 2009	(Muraleetharan et al, 2005; Ewing et al, 2006; Petritsch et al, 2006; Jensen, 2007; Dandan et al, 2007; Muraleetharan & Hagiwara, 2007; FDOT, 2009)	✓	✓	✓	✓	✓	✓	
2010 - 2014	(HCM, 2010; Kim et al, 2011; Christopoulou & Pitsiava-Latinopoulou, 2012; Lee et al, 2013; Carter et al, 2013; Kim, Choi, & Kim, 2013; Kang, Xiong, & Mannering, 2013; Kim et al, 2014)	✓	✓	✓	✓	✓		✓
2015 - hoy	(Talavera-Garcia & Soria-Lara, 2015; HCM, 2016; Motamed & Bitaraf, 2016; Kang & Fricker, 2016; Choi et al, 2016; Marisamynathan & Lakshmi, 2016; Sahani, Ojha, & Bhuyan, 2017)	✓	✓	✓	✓	✓	✓	✓

- No hay mucha información en la literatura sobre la forma en la cual los peatones perciben la calidad de servicio.
- Desarrollar un modelo que explica como influyen las percepciones de los usuarios sobre su calidad de servicio percibida.

- Encuesta de interceptación aleatoria (8 minutos).
- Recolección de datos en 30 puntos de la ciudad de Bogotá.
- Las encuestas se aplicaron entre el 2 y el 19 de junio de 2018 durante días hábiles.
- Se obtuvieron 1056 respuestas validas con una tasa de respuesta de 33.2%.

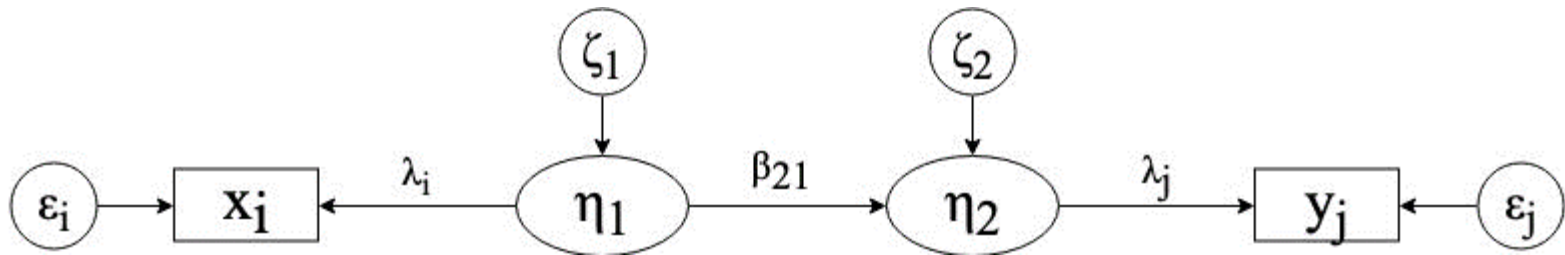


Type	Variable	Statement/Question	Range
General perceptions	Restrooms	Being 0 totally uncomfortable and 10 totally comfortable, rate from 0 to 10 in general how comfortable it would be the presence of the following when walking	0 – 10
	Shops		
	Shadow		
	Bike flow	Being 0 does not bother me at all and 10 bothers me a lot, rate from 0 to 10 how much bothers you the presence on the sidewalk of the following when walking	
	Bike speed		
Opposite direction flow			
Same direction flow			

Type	Variable	Statement/Question	Range
On site perceptions	Road width Lanes HGV flow Vehicular speed Pollution Noise	Being 0 does not bother me at all and 10 bothers me a lot, rate from 0 to 10 how much bothers you the following characteristics at this point of the sidewalk	
	Being 0 totally disagree and 10 totally agree, rate from 0 to 10 the following statements		
	Pedestrians far from me	When walking on this sidewalk, I prefer other pedestrians separated from me	
	Stress	Walking on this sidewalk is stressful	
	Too many pedestrians	On this sidewalk, the number of pedestrians does not let me walk freely	
	I prefer not to walk here	I would rather not walk on this sidewalk	
	Weather Lighting Odor Environment Cleanliness Landscape	Being 0 totally uncomfortable and 10 totally comfortable, rate from 0 to 10 how comfortable you feel at this moment with the following aspects in this place	0 – 10
	Security Sidewalk safety Road safety	Being 0 totally unprotected and 10 fully protected, rate from 0 to 10 how protected you feel at this time regarding the following aspects in this place	
	Width Condition Furniture Trees Public transit access Signage	Being 0 lousy and 10 excellent, rate at this point from 0 to 10 the following	

- Aproximación a los modelos
 - EFA (análisis factorial exploratorio)
 - CFA (análisis factorial confirmatorio)
 - SEM (ecuaciones estructurales)

- Aproximación a los modelos (ecuaciones estructurales)



$$y_j = \alpha_j + \lambda_j \eta_2 + \varepsilon_j$$

$$x_i = \alpha_i + \lambda_i \eta_1 + \varepsilon_i$$

$$\eta_2 = \beta_{21} \eta_1 + \zeta_2$$

- Variables latentes propuestas (EFA)

Latent variables	Attributes
Sidewalk characteristics	Width, condition, furniture, trees, public transport access, and signage
Externalities	Vehicular road width, number of vehicular lanes, HGV flow, vehicular speed, and noise
Surrounding	Weather, lighting, odor, environment, cleanliness, and landscape
Discomfort	I prefer pedestrians far from me, stress, number of pedestrians do not let me walk here, and I prefer not to walk here
Bike hassles	Flow, speed, bikes in the opposite direction, and bikes that exceed me
Protection	Security, sidewalk safety, and road safety
Amenities	Restrooms, shops, and shadow

- Indicadores de ajuste del modelo final

Indicator	Explanation	Model result	Threshold accepted
χ^2/DF	This indicator measures the discrepancy between the sample and model covariances matrices corrected for degrees of freedom.	2.124	< 3.000
RMSEA	This indicator determines the model fit to the covariance matrix of the sample with unknown coefficients.	0.033	< 0.060
CFI	This indicator compares the proposed model χ^2 with a non-correlated model between latent variables.	0.953	> 0.950
SRMR	This indicator calculates the square root of the difference between the sample and the hypothesized model covariances matrix residuals.	0.038	< 0.080

Resultados y Discusión

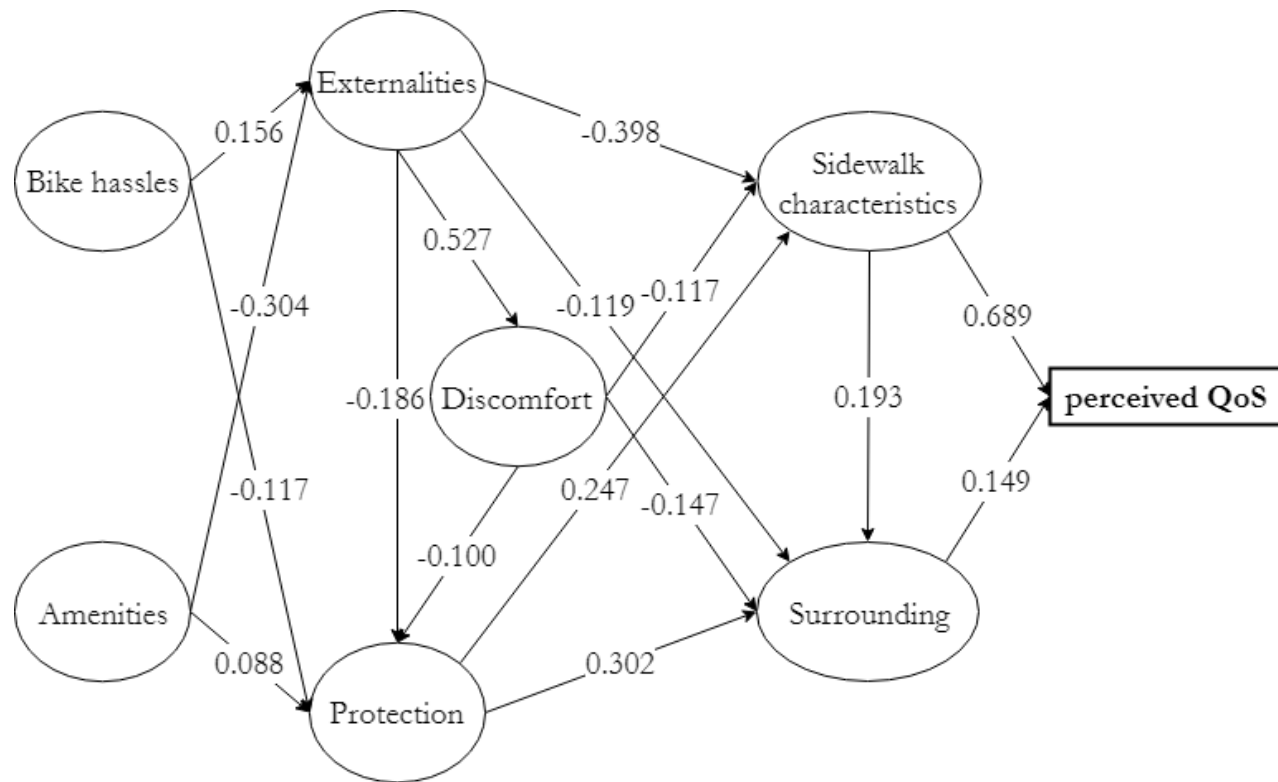
- Modelo de medición

Attribute	Factor	α	λ	t-statistic
Service quality	-	2.383	-	-
Width		1.771	0.708	35.702
Condition		1.550	0.731	33.870
Furniture	Sidewalk	1.473	0.640	28.736
Trees	characteristics	1.225	0.586	24.424
Public transit access		1.650	0.422	14.636
Signage		1.363	0.625	28.392
Road width		1.016	0.619	21.854
Lanes		1.034	0.621	21.679
HGV flow	Externalities	1.315	0.636	21.593
Vehicular speed		1.428	0.629	21.480
Noise		2.489	0.381	11.631
Weather		2.671	0.373	12.448
Lighting		3.451	0.418	14.042
Odor	Surrounding	1.971	0.665	25.665
Environment		2.568	0.778	41.976
Cleanliness		1.711	0.713	35.363
Landscape		2.184	0.679	31.912
Pedestrians far from me		1.137	0.462	15.880
Stress	Discomfort	1.033	0.750	35.082
Too many pedestrians		1.071	0.704	31.410
I prefer not to walk here		0.942	0.631	25.918
Bike flow		2.289	0.753	41.244
Bike speed	Bike hassles	3.737	0.851	53.889
Opposite direction flow		2.690	0.627	27.970
Same direction flow		2.868	0.647	29.798
Security		1.039	0.653	28.704
Sidewalk safety	Protection	1.325	0.824	42.785
Road safety		1.401	0.726	34.565
Restrooms		1.530	0.433	10.305
Shops	Amenities	2.887	0.589	12.451
Shadow		3.148	0.471	10.947

- Efectos directos e indirectos

MODEL	β and λ						
	Sidewalk characteristics	Surrounding	Externalities	Discomfort	Protection	Bike hassles	Amenities
Direct							
Service quality (t-statistic)	0.689 (29.040)	0.149 (5.114)					
Sidewalk characteristics (t-statistic)			-0.398 (-8.430)	-0.117 (-2.591)	0.247 (7.009)		
Surrounding (t-statistic)	0.193 (4.215)		-0.119 (-2.177)	-0.147 (-3.268)	0.302 (8.219)		
Externalities (t-statistic)						0.156 (3.890)	-0.304 (-6.068)
Discomfort (t-statistic)			0.527 (14.590)				
Protection (t-statistic)			-0.186 (-3.217)	-0.100 (-1.972)		-0.117 (-3.088)	0.088 (1.707)
Indirect							
Service quality	0.029		-0.412	-0.128	0.222	-0.090	0.145
Sidewalk characteristics			-0.121	-0.025		-0.110	0.178
Surrounding			-0.250	-0.058	0.048	-0.099	0.143
Externalities							
Discomfort						0.082	-0.160
Protection			-0.053			-0.037	0.073
Total							
Service quality	0.718	0.149	-0.412	-0.128	0.222	-0.090	0.145
Sidewalk characteristics			-0.519	-0.142	0.247	-0.110	0.178
Surrounding	0.193		-0.369	-0.205	0.350	-0.099	0.143
Externalities						0.156	-0.304
Discomfort			0.527			0.082	-0.160
Protection			-0.239	-0.100		-0.154	0.161

- Modelo de ecuaciones estructurales



- Hay pocos estudios que involucren las percepciones de los usuarios (peatones) para explicar la QoS
- Las percepciones tienen una muy buena capacidad de explicar la QoS.

- La percepción del usuario sobre los elementos de la infraestructura son los que mayor influencia tienen sobre la QoS percibida.
- Sin embargo, la QoS no solo es explicada por la percepción de elementos de la infraestructura, sino de otros estímulos del entorno, tangibles e intangibles.
- Las relaciones complejas sobre la percepción de QoS se puede mapear con la utilización de SEM.
- Futuros modelos para conocer la QoS percibida deberían considerar los efectos de las percepciones de los usuarios sobre la percepción de QoS.

¡Gracias!



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