

COMPARACION DE ASPECTOS CUANTITATIVOS DE SISTEMAS DE RIELES EN ESTADOS UNIDOS Y LATINO AMERICA Y EL TREN URBANO

El trabajo consiste en hacer comparaciones detalladas de aspectos cuantitativos de sistemas de rieles como: tipo de sistema, población servida, número de líneas, número de estaciones, largo, frecuencia del servicio, cantidad de pasajeros, número de trenes, gastos de operación, fuentes de ingreso y tarifas.

Con la información obtenida de los aspectos antes mencionados de los sistemas de rieles se analizarán varios sistemas de rieles en Estados Unidos y Latino América y se establecerán los criterios finales para la selección de los casos de estudio. Estos casos de estudios serán comparados con el Tren Urbano para determinar cuan viable es la propuesta del Tren Urbano.

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QUANTITATIVE ASPECTS OF URBAN RAIL SYSTEMS

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TREN URBANO RESEARCH PROGRAM

FIRST SEMESTER PROGRESS PRESENTATION

UPR - MAYAGUEZ

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Presentation Outline

- **Research Objectives**
- **Definition of Quantitatives Aspects**
- **Research Methodology**
- **Literature Review**
- **Progress to Date**
- **Questions, Comments, Suggestions**

Objectives

- **Collection of information related to rail systems in United States and Latin America.**
- **Examine the quantitative aspects of these systems and their impacts on urban areas.**
- **Establish relationship between those rail systems and Tren Urbano.**

Research Methodology (Year One)

- Preliminary Research
- Collection and analysis of general quantitative data
 - Rail systems in United States
 - Rail systems in Latin America
- Develop information standardized by population, route, vehicles, length of the system...
- Comparison between rail types
- Comparison between U.S. and Latin American systems

Research Methodology

(Second Year)

- Establish the final criterion for the selection of case studies
- Identification and investigation of case studies.
- Establish relationship between these systems and Tren Urbano.
- Fares

Literature Review

- DIA-F
- NTAT
- INTERNET
- ALAMYS

U.S. Rail Systems (heavy rail)

- **MARTA: Atlanta, GA**
- **MTA: Baltimore, MD**
- **MBTA: Boston, MA**
- **NYCTA: Brooklyn, NY**
- **RTA: Cleveland, OH**
- **CTA: Chicago, IL**
- **LACMTA: Los Angeles, CA**
- **MDTA: Miami, FL**
- **PATH: New York, NY**
- **BART: Oakland, CA**
- **WMATA: Washington, DC**

U.S. Rail Systems (light rail)

- **RTD: Denver, CO**
- **MTA: Baltimore, MD**
- **MBTA: Boston, MA**
- **NJ Transit: Newmark, NJ**
- **RTA: Cleveland, OH**
- **PAT: Pittsburg, PA**
- **LACMTA: Los Angeles, CA**
- **Tri-Met: Portand, OR**
- **Muni: San Francisco, CA**
- **SEPTA: Philadelphia, PA**
- **SCCTD: San Jose, CA**
- **MTDB: San Diego, CA**

Latin American Systems

- **METROVIAS S.A., Argentina**
- **METRO CARACAS, Venezuela**
- **SISTEMA TRANSPORTE COLECTIVO-METRO, Mexico**
- **METRO DE MEDELLIN, Colombia**
- **SISTEMA TRANSPORTE COLECTIVO METRORREY, Monterrey, Mexico**
- **RIO DE JANEIRO, Brasil**
- **METRO DE SANTIAGO, Chile**
- **SAO PAULO - METRO BRASIL, Brasil**

Table #1: Characteristics of the different agencies (heavy rail)

State	Agency	Population (Service Area)	Square Miles (Service Area)	Directional Route (miles)	Total Fleet	Vehicles Operates at maximum service	Average Fleet Age (years)	Percent Spares (%)
Georgia	Metropolitan Atlanta Rapid System (MARTA)	1,241,000	804	80.8	238	238	10.9	0
Maryland	Maryland - Mass Transit Administration (Maryland MTA)	2,077,667	1,795 . 7	26.6	100	48	9.4	108
Massachusetts	Boston Massachusetts Bay Transportation Authority (MBTA)	2,602,487	1038	75.8	432	406	16.8	6
New York	New York-MTA-New York City Transit Authority (NYCTA)	14,648,000	618	492.8	5,803	4,948	21.5	17
Ohio	Greater Cleveland Regional Transit Authority (RTA)	1,412,140	687	38.2	60	35	11.0	71
Illinois	Chicago-RTA-Chicago Transit Authority (CTA)	3,708,773	356	207.7	1,230	804	11.6	53
California	Los Angeles County Metropolitan Transportation Authority (LACMTA)	9,087,715	4,070	6.0	30	16	3.0	88
Florida	Miami-Metro-Dade Transit Agency (MDTA)	1,735,000	285	42.2	136	76	12.0	79
New York	NY-Port Authority Trans Hudson Corporation (PATH)	2,820,000	196	28.6	342	282	21.8	21
Philadelphia	Philadelphia-Southeastern Pennsylvania Transportation Authority (SEPTA)	4,222,211	1,164	76.1	373	292	25.1	28
California	San Francisco-Bay Area Rapid Transit District (BART)	1,267,766	234	142.0	589	406	16.7	45
Washington	Washington Metropolitan Area Transit Authority (WMATA)	3,005,757	1,486	178.2	764	588	11.2	30

Table #2: Performances Measures (heavy rail)

State	Agency		Operating Expenses (\$)	Capital Funding (\$)	Annual Passenger Miles	Annual Vehicles Revenue Miles	Annual Vehicles Revenue Hours	OE/VRM (\$)	OE/VRH (\$)	OE/PM (\$)	OE/UPT (\$)	PT/VRM	PT/VRH
Georgia	Metropolitan Atlanta Rapid System (MARTA)	MARTA	74,755,074	79,226,366	378,370,443	20,853,541	801,708	3.58	93.24	0.20	1.07	3.35	87.13
Maryland	Maryland - Mass Transit Administration Maryland (MTA)	MTA	32,951,862	58,876,646	54,890,521	3,656,434	142,265	9.01	231.62	0.60	3.15	2.86	73.59
Massachusetts	Boston Massachusetts Bay Transportation Authority (MBTA)	MBTA	180,676,172	92,716,704	494,525,996	19,835,376	901,608	9.11	200.39	0.37	1.11	8.20	180.43
New York	New York-MTA-New York City Transit Authority (NYCTA)	NYCTA	2,243,405,771	829,939,068	5,845,434,256	300,167,289	16,480,298	7.47	136.13	0.38	1.71	4.36	79.39
Ohio	Greater Cleveland Regional Transit Authority (RTA)	RTA	19,595,388	15,579,278	52,986,065	1,909,905	73,460	10.26	266.75	0.37	2.84	3.62	94.03
Illinois	Chicago-RTA-Chicago Transit Authority (CTA)	CTA	299,381,058	179,755,639	908,569,102	45,744,707	1,907,783	6.54	156.93	0.33	2.09	3.14	75.26
California	Los Angeles County Metropolitan Transportation Authority (LACMTA)	LACMTA	21,487,501	5,626,507	7,469,374	624,968	43,190	34.38	497.51	2.88	4.32	7.95	115.11
Florida	Miami-Metro-Dade Transit Agency (MDTA)	MDTA	47,595,116	4,997,516	113,675,344	5,522,059	223,187	8.62	213.25	0.42	3.32	2.59	64.20
New York	NY-Port Authority Trans Hudson Corporation (PATH)	PATH	155,877,000	37,246,000	281,567,363	12,797,483	634,463	12.18	245.68	0.55	2.41	5.05	101.83
Philadelphia	Philadelphia-Southeastern Pennsylvania Transportation Authority (SEPTA)	SEPTA	119,560,126	115,530,940	414,263,293	15,518,422	783,631	7.70	152.57	0.29	1.27	6.05	119.82
California	San Francisco-Bay Area Rapid Transit District (BART)	BART	210,514,389	372,605,462	915,990,550	43,054,240	1,204,140	4.89	174.83	0.23	2.72	1.80	64.39
Washington	Washington Metropolitan Area Transit Authority (WMATA)	WMATA	334,748,748	265,520,685	1,064,952,092	40,202,393	1,525,704	8.33	219.41	0.31	1.71	4.87	128.36

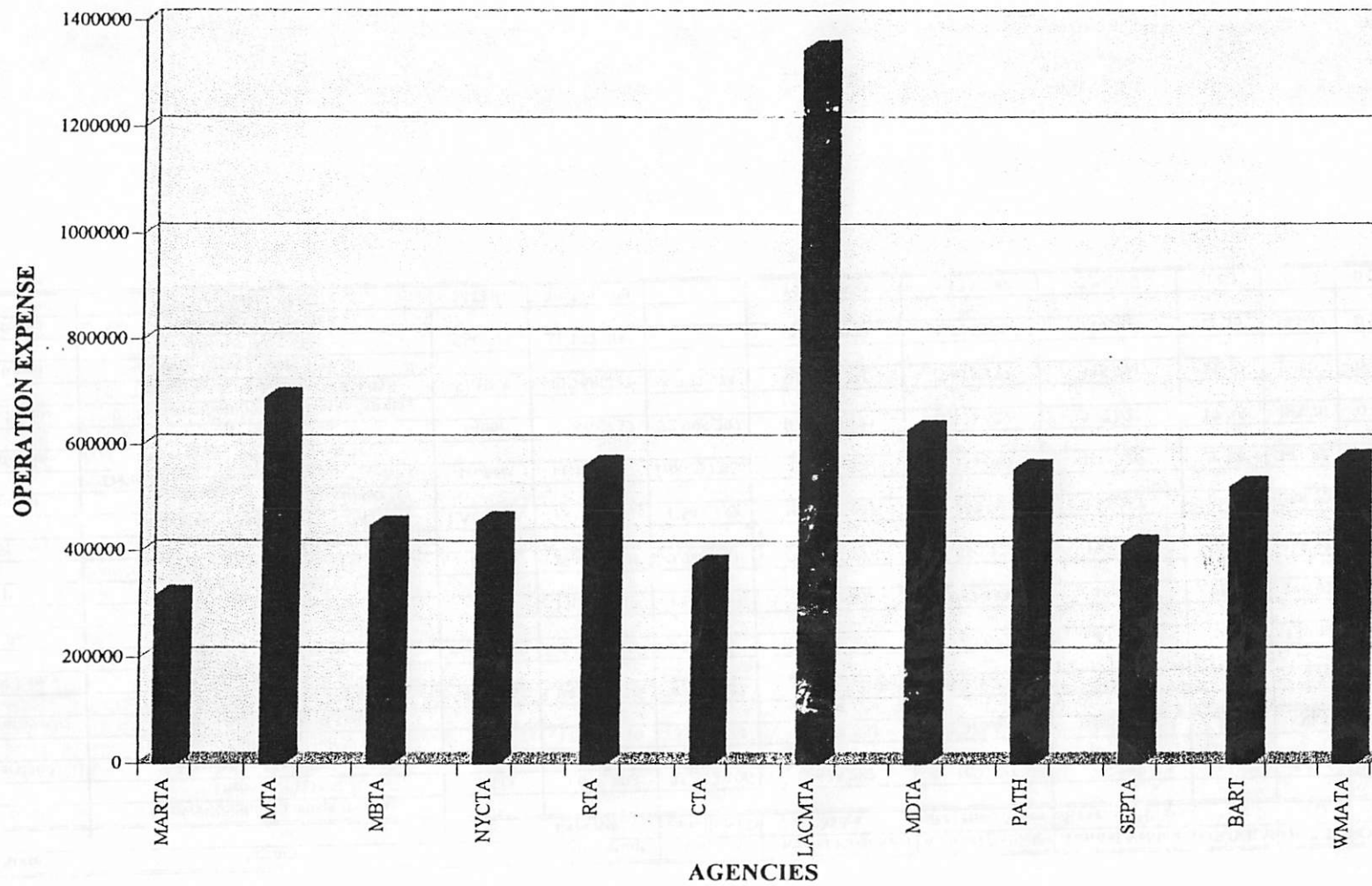
Table #3: Characteristics of the different agencies (light rail)

State	Agency	Population (Service Area)	Square Miles (Service Area)	Directional Route (miles)	Total Fleet	Vehicles Operates at maximum service	Average Fleet Age (years)	Percent Spares (%)
Denver	Denver-Regional Transportation District (RTD)	2,000,000	2,406	10.6	11	10	1.0	10
Maryland	Maryland - Mass Transit Administration (Maryland MTA)	2,077,667	1,795	43.6	35	30	2.0	17
Massachusetts	Boston Massachusetts Bay Transportation Authority (MBTA)	2,602,487	10.38	55.9	209	177	13.7	18
New Jersey	NJ - New Jersey Transit Corporation (NJ Transit)	7,495,000	6,559	8.3	22	16	27.5	38
Ohio	Greater Cleveland Regional Transit Authority (RTA)	1,412,140	687	26.7	49	26	13.0	39
PA	Pittsburg-Port Authority of Allegheny County (PAT)	1,523,198	775	38.1	71	44	17.3	61
California	Los Angeles County Metropolitan Transportation Authority (LACMTA)	9,087,715	4,070	43.2	54	36	5.0	50
Oregon	Portland-Tri-County Metropolitan Transportation District of Oregon (Tri-Met)	988,284	592	30.2	26	23	9.1	13
California	San Francisco Municipal Railway (Muni)	723,959	49	49.7	128	101	20.6	27
Philadelphia	Philadelphia-Southeastern Pennsylvania Transportation Authority (SEPTA)	4,222,211	1,164	69.3	147	100	14.9	47
California	Santa Clara County Transit District (SCCTD)	1,136,614	300	39	54	38	13.6	42
California	San Diego Trolley, Inc. (The Trolley) MTDB	1,500,000	570	41.5	71	59	7.1	20

Table #4: Performance Measures (light rail)

State	Agency		Operating Expenses (\$)	Capital Funding (\$)	Annual Passenger Miles	Annual Vehicles Revenue Miles	Annual Vehicles Revenue Hours	OE/VRM (\$)	OE/VRH (\$)	OE/PM (\$)	OE/UPH (\$)	PT/VRM	PT/VRH
Denver	Denver-Regional Transportation District (RTD)	RTD	3,678,803	35,243,106	2,633,282	109,409	6,781	33.62	542.5	1.40	3.81	8.82	142.25
Maryland	Maryland - Mass Transit Administration (Maryland MTA)	MTA	17,438,116	8,822,774	40,838,601	2,215,632	129,618	7.87	135.43	0.43	2.80	2.81	48.06
Massachusetts	Boston Massachusetts Bay Transportation Authority (MBTA)	MBTA	94,954,310	4,471,552	151,913,214	5,529,239	368,616	17.17	257.60	0.63	0.88	19.62	294.37
New Jersey	NJ - New Jersey Transit Corporation (NJ Transit)	NJ Transit	6,027,716	831,381	11,878,832	664,087	43,328	9.08	139.12	0.51	1.58	5.74	88.00
Ohio	Greater Cleveland Regional Transit Authority (RTA)	RTA	11,375,443	1,684,833	27,179,562	953,453	46,070	11.93	246.92	0.42	2.67	4.47	92.47
PA	Pittsburg-Port Authority of Allegheny County (PAT)	PAT	27,471,358	9,946,631	35,758,200	1,650,476	103,337	16.64	265.84	0.77	3.46	4.81	76.87
California	Los Angeles County Metropolitan Transportation Authority (LACMTA)	LACMTA	43,943,461	1,547,339	103,122,242	2,943,994	152,267	14.93	288.59	0.43	3.71	4.02	77.82
Oregon	Portland-Tri-County Metropolitan Transportation District of Oregon (Tri-Met)	Tri-Met	14,450,117	108,727,952	46,418,361	1,554,089	102,326	9.30	141.22	0.31	1.70	5.46	82.89
California	San Francisco Municipal Railway (Muni)	Muni	62,830,739	72,995,297	102,170,472	3,621,629	342,021	17.35	183.70	0.61	1.67	10.39	109.98
Philadelphia	Philadelphia-Southeastern Pennsylvania Transportation Authority (SEPTA)	SEPTA	40,758,277	5,793,974	91,833,631	2,813,439	315,791	14.49	129.07	0.44	1.02	14.24	126.84
California	Santa Clara County Transit District (SCCTD)	SSCTD	21,177,400	-	29,501,000	1,715,200	114,800	12.35	184.49	0.72	3.45	-	-
California	San Diego Trolley, Inc. (The Trolley) MTIDB	MTIDB	19,337,300	-	75,620,000	4,175,700	220,300	4.63	87.77	0.26	1.30	-	-

OPERATION EXPENSE PER VEHICLE



Questions, Comments, Suggestions

