What Happened to Our Transit Usage? An Exploratory Application to Investigate the Impacts of Demographics, Built Environments, and Commuting Patterns on Transit Usage

Tom Vo
Jung Seo
JungA Uhm
SungHo Ryu
Frank Wen

Background Information

Public transportation is considered one of the significant components of the Southern California Association of Governments (SCAG)'s Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). Its positive externalities are well known for most people such as improving air quality, relieving traffic congestion, improving public safety, improving quality of life, and so forth. A recent study completed by the UCLA Institute of Transportation Studies and commissioned by SCAG on California's transit ridership has explored an array of possible factors for falling transit use. The study has found that, of the possible causes examined (e.g. transit service and fare, fuel price, transportation network companies, neighborhood change, migration of lower-income population (or transit use populace), and vehicle access), vehicle access was found to be the largest and decisive factor. Income, age and many other factors matter but in ways how they influence vehicle access.

Methodology

To better understand the relationship between transit ridership and various factors, this study conducts spatiotemporal analysis of socioeconomic characteristics, built environments and commuting patterns of neighborhoods with rail transit stations in the SCAG region. To achieve this, the project includes necessary variables which provides an environment where stakeholders can explore different patterns around each transit station. The data utilizing in this project comes from various products generated by the Census Bureau such as decennial census, American community survey (ACS), census transportation planning products (CTPP), longitudinal employer-household dynamics (LEHD), national household travel survey (NHTS) as well as SCAG's specialized comprehensive region-wide land use datasets. The beauty of using these products is that each of them focus on different aspect of transportation- and demographic-related characteristics. For instance, CTPP provides detailed commuting patterns from origin to destination for different demographic groups; whereas, NHTS provides detailed information on travel behaviors. By using different data sources, it will be beneficial to understand the reason of declining transit ridership and will also provide guidance on promoting the public to use public transportation.

Expected Outcomes

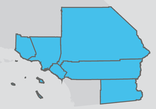
By utilizing an interactive web application tool this study effectively visualizes the spatiotemporal patterns of socioeconomic characteristics, built environments and commute of transit station areas in the SCAG region. This comprehensive visual library of station areas allows users to explore the characteristics of each transit neighborhood at various geographic level which can guide more strategic policy decisions.

Future Improvements

There is a variety of improvements that can be incorporated into this particular explorative application. They range from statistical modelings to visualization techniques as well as social platform for enthusiasts to share their thoughts.

Sources:
<> American Community Survey
<> Census Transportation Planning Products
<> Longitudinal Employer-Household Dynamics
<> Southern California Association of Governments

SCAG

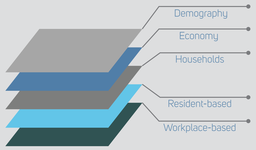


38,000 mi²

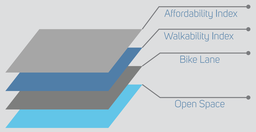
19.0 M (2017)

Land Use	Acres	%
Residential	1,154,378	5%
Commercial	2,758,351	12%
Industrial	204,911	1%
Transportation, Communications, and Utilities	221,087	1%
Open Space and Recreation	4,333,991	19%
Agriculture	1,266,693	6%
Vacant (Unifferentiated, Limited Improvements)	11,401,304	51%
Water	253,738	1%
Protected Land	633,970	3%

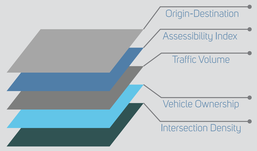
Socioeconomic Characertistics



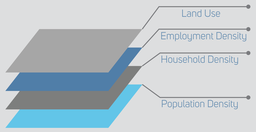
Livability Characertistics

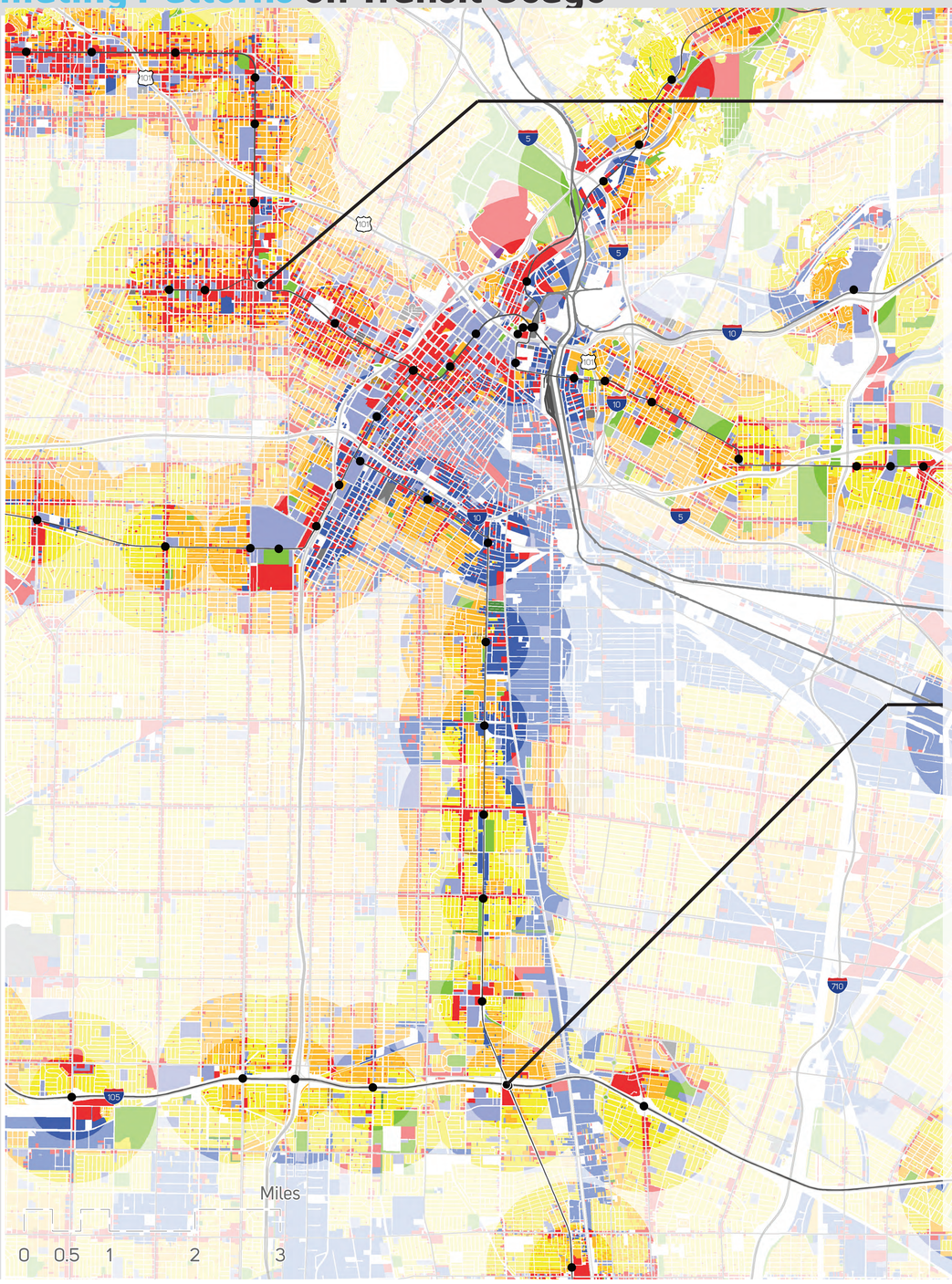


Mobility Characertistics



Neighborhood Characertistics





Wilshire/Vermont Station (one mile)

Population Characteristics

	HISPANIC POPULATION	NON-HISPANIC WHITE POPULATION	NON-HISPANIC BLACK POPULATION	NON-HISPANIC INDIAN POPULATION	NON-HISPANIC ASIAN POPULATION	NON-HISPANIC OTHERS POPULATION
ACS 13-17	56.2%	6.7%	4.6%	0.2%	30.6%	1.6%
ACS 08-12	58.5%	6.1%	4.1%	0.3%	29.8%	1.3%

	AGE 0-14 POPULATION	AGE 15-65 POPULATION	AGE 65+ POPULATION	JOB BY EARNINGS $1,250/MONTH OR LESS (LEHD, 2015)	JOB BY EARNINGS $1,251-$3,333/MONTH (LEHD, 2015)	JOB BY EARNINGS MORE THAN $3,333/MONTH (LEHD, 2015)
ACS 13-17	17.3%	76.5%	9.6%	18.8%	37.5%	43.7%
ACS 08-12	18.0%	74.1%	7.9%			

Household Characteristics

	HOUSEHOLDS BELOW 35K	HOUSEHOLDS 35K - 75K	HOUSEHOLDS 75K AND UP	SINGLE-FAMILY RESIDENTIAL UNITS	MULTIPLE-FAMILY RESIDENTIAL UNITS
ACS 13-17	49.0%	34.7%	16.3%	3.0%	97.0%
ACS 08-12	54.9%	33.6%	11.5%	3.0%	97.0%

Transportation Characteristics (Workers 16+ Years)

	DROVE ALONE	CARPOOLED	PUBLIC TRANSPORATION	TAXICAB, MOTORCYCLE, OTHER MEANS	BICYCLE	WALKED	WORKED AT HOME
ACS 13-17	50.3%	9.6%	29.5%	1.0%	1.3%	4.0%	4.4%
ACS 08-12	46.3%	9.8%	33.1%	0.9%	0.8%	4.4%	4.7%

Livability Characteristics

EXISTING LAND USE			AFFORDABILITY INDEX (avg)	WALKABILITY INDEX	INTERSECTION DENSITY (sqmi)	BIKE LANE (mi)
RESIDENTIAL	47%	Station	53.2	15.7	133.1	21.7
COMMERCIAL	32%					
INDUSTRIAL	3%					
PUBLIC FACILITIES	8%					
EDUCATION	5%	All Stations	62.6	13.2	114.5	19.7
OPEN SPACE	1%					
OTHERS	4%					
TOTAL	100%					

21.7 (station)

Willowbrook/Rosa Parks Station (one mile)

Population Characteristics

	HISPANIC POPULATION	NON-HISPANIC WHITE POPULATION	NON-HISPANIC BLACK POPULATION	NON-HISPANIC INDIAN POPULATION	NON-HISPANIC ASIAN POPULATION	NON-HISPANIC OTHERS POPULATION
ACS 13-17	71.2%	1.7%	25.6%	0.4%	0.6%	0.5%
ACS 08-12	68.7%	2.1%	27.0%	0.2%	0.5%	1.5%

	AGE 0-14 POPULATION	AGE 15-65 POPULATION	AGE 65+ POPULATION	JOB BY EARNINGS $1,250/MONTH OR LESS (LEHD, 2015)	JOB BY EARNINGS $1,251-$3,333/MONTH (LEHD, 2015)	JOB BY EARNINGS MORE THAN $3,333/MONTH (LEHD, 2015)
ACS 13-17	29.6%	73.1%	6.4%	22.3%	39.5%	38.2%
ACS 08-12	30.4%	64.8%	4.8%			

Household Characteristics

	HOUSEHOLDS BELOW 35K	HOUSEHOLDS 35K - 75K	HOUSEHOLDS 75K AND UP	SINGLE-FAMILY RESIDENTIAL UNITS	MULTIPLE-FAMILY RESIDENTIAL UNITS
ACS 13-17	51.1%	31.1%	17.8%	57.9%	42.1%
ACS 08-12	55.0%	32.8%	12.1%	42.1%	43.9%

Transportation Characteristics (Workers 16+ Years)

	DROVE ALONE	CARPOOLED	PUBLIC TRANSPORATION	TAXICAB, MOTORCYCLE, OTHER MEANS	BICYCLE	WALKED	WORKED AT HOME
ACS 13-17	68.4%	13.4%	11.0%	0.8%	0.3%	1.5%	4.6%
ACS 08-12	62.8%	19.0%	10.5%	1.8%	0.1%	2.1%	3.7%

Livability Characteristics

EXISTING LAND USE			AFFORDABILITY INDEX (avg)	WALKABILITY INDEX	INTERSECTION DENSITY (sqmi)	BIKE LANE (mi)
RESIDENTIAL	61%	Station	58.8	13.6	148.9	18.1
COMMERCIAL	6%					
INDUSTRIAL	11%					
PUBLIC FACILITIES	4%					
EDUCATION	7%	All Stations	62.6	13.2	114.5	19.7
OPEN SPACE	2%					
OTHERS	8%					
TOTAL	100%					

Single Family Residential
Multi-Family Residential
Rural Residential
Office, Commercial, and Services
Public Facilities
Military Installations
Industrial
Mixed Residential and Commercial
Open Space and Recreation
Agriculture
Under Construction
Undevelopable
Train Station
Willow Brook Station
Wilshire/Vermont Station

SCAG™
INNOVATING FOR A BETTER TOMORROW

Transportation Research Board
98th Annual Meeting
January 13-17, 2019
Washington, D.C., USA