APPLICATION OF LEHD DATA IN SPATIAL MISMATCH AND ACCESSIBILITY ANALYSIS

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LED Annual Workshop
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Outlines

Integrated land use and transportation system
• The connection between jobs and home

The benefits of applying LEHD Data
• Accessibility
• Proximity
• Connectivity

Job sprawl and spatial mismatch
• Housing conditions
Integrated Transportation and Land Use System

- **Transportation**
  - *Decisions:*
    - Trip
    - Choice: Destination, Mode, Route
  - *Travel Time, Distance & Cost*
  - *Accessibility*

- **Land Use**
  - Activities
  - Attractiveness
  - Location decisions of investors

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*The Land-Use Transport Feedback Cycle*
*Source: Wegener, 2004*

Dallas--Fort Worth--Arlington, TX

When Does Congestion Happen?

<table>
<thead>
<tr>
<th>Year</th>
<th>Delay per Commuter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>20</td>
</tr>
<tr>
<td>1990</td>
<td>30</td>
</tr>
<tr>
<td>1995</td>
<td>40</td>
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<tr>
<td>2000</td>
<td>50</td>
</tr>
<tr>
<td>2005</td>
<td>60</td>
</tr>
<tr>
<td>2010</td>
<td>70</td>
</tr>
<tr>
<td>2015</td>
<td>80</td>
</tr>
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</table>

Cost Comparisons

<table>
<thead>
<tr>
<th>Measure</th>
<th>Cost Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay Split</td>
<td>Cost Comparisons</td>
</tr>
<tr>
<td></td>
<td>Cost Comparisons</td>
</tr>
</tbody>
</table>

2017 Congestion

- Annual Total Delay: 224,883,000 Hours
- Delay National Rank: 9
- Annual Delay per Auto Commuter: 67 Hours
- Delay per Auto Commuter National Rank: 13
- Congested Weekday Hours: 4.5

- Planning Time Index (PTI): 1.79
- PTI National Rank: 26
- Travel Time Index (TTI): 1.26
- TTI National Rank: 23

- Annual Truck Delay: 9,445,000 Truck Hours
- Annual Truck Delay National Rank: 9
- Annual Congestion Cost (Trucks): $494M
- Congestion Cost (Truck) National Rank: 9
Express Lanes
Reduce Delays, Manage Congestion & Reliable Travel Times

- Increase roadway capacity
- Help manage congestion on the highways
- Offer choice by allowing drivers to pay a **toll** and providing a reliable, shorter travel time.
- Tolls can change in price depending on the level of congestion
- As traffic increases, the toll price goes up to provide a free-flowing alternative for travelers at all times
Eight major Dallas-Fort Worth corridors feature TEXpress Lanes and HOV/Express Lanes: 120 miles.

They connect throughout the area to form a continuous system and offer drivers more choice in their daily commutes, as well as predictable travel speeds.
Work Area Profile Analysis

Job Density

Legend:
- 5 - 4,732 Jobs/Sq.Mile
- 4,733 - 18,916 Jobs/Sq.Mile
- 18,917 - 42,555 Jobs/Sq.Mile
- 42,556 - 75,650 Jobs/Sq.Mile
- 75,651 - 118,201 Jobs/Sq.Mile
Work Area Profile Analysis

Identify Potential Toll Road Users

Workers Aged 30 to 54
Work Area Profile Analysis: Income

Identify Potential Toll Road Users

Workers Earning More than $3,333 per month
Work Area Profile Analysis

Workers in the "Goods Producing" Industry
Workers Earnings: Regional Data

Work Area Comparison Analysis by Metropolitan/Micropolitan Areas (CBSA)

Workers Earning More than $3,333 per month
JOB SPRAWL & SUBURBAN JOB OPPORTUNITIES FOR LOW-WAGE WORKERS
Motivations

■ Mapping Job growth & spatial inequality
  - Where new jobs are added
  - Where low-jobs are located
  - Where low-wage workers live

■ Data availability
  - Home & Work Locations
  - Affordability
  - Accessibility

■ Data Integration
  - Overlapping datasets and Creating interactive maps
JOB OPPORTUNITIES
Spatial Mismatch Hypothesis (SMH)

- First introduced by John Kain (1965, 1968)
  - Jobs/housing mismatch—job decentralization and housing segregation
  - Most new employment opportunities are created in suburbs.
  - The difficulty people have in getting to jobs makes unemployment unnecessarily high.

  - An urban underclass population has grown rapidly within the inner city, and the movement of jobs from the city to suburbs is one of the causal factors.

More Info:
Key Factors

1. Job Locations
2. Home Locations
3. Location Affordability
4. Job Accessibility

- Jobs
  - LEHD Work Area Profile
  - Location Affordability Index

- Home
  - LEHD Home Area Profile

- Spatial Mismatch
  - Destination Accessibility
  - Job Accessibility
  - Employment Access Index

- Affordability
  - HUD LIHTC
  - Housing + Transportation Cost
  - Location Affordability Index

- Accessibility
  - Income
  - Race
  - Gender
Datasets & Tools

Data
- LEHD
- U.S Census, American Community Survey
- HUD Low-Income Housing Tax Credits (LIHTC) Properties (U.S Dept. Housing & Urban Development)
- The Place Database, Lincoln Institute of Land Policy
- Transit Data: General Transit Feed Specification (GTFS)

Tools
- LEHD “OnTheMap” Web Tool
- American Fact Finder
- EPA EJSCREEN
- ArcGIS Desktop; ArcGIS Online
Longitudinal Employer-Household Dynamics (LEHD)

Provides statistics on employment, including information on:

- Resident workers
- Jobs
- Commute flows
- Origin-Destination Employment Statistics (LODES)

Applications

- **J2J Explorer**: Job-to-Job Flows
- **QWI Explorer**: Quarterly Workforce Indicators (QWI)
- **OnTheMap**
- **LED Extraction Tool**

Sources:

- [https://lehd.ces.census.gov/data/](https://lehd.ces.census.gov/data/)
Work Area Profile Analysis

Where are workers employed?

- DFW Airport
- Plano
- Frisco
- Dallas

**OnTheMap**

Start  | Base Map  | Selection  | Results  

**Work Area Profile Analysis**

Job Locations

**Total All Jobs**

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>Count</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total All Jobs</td>
<td>3,372,034</td>
<td>100.0%</td>
<td></td>
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</tbody>
</table>

**Worker Age**

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>Count</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 25 or younger</td>
<td>753,967</td>
<td>22.4%</td>
<td></td>
</tr>
<tr>
<td>Age 30 to 54</td>
<td>1,921,854</td>
<td>57.0%</td>
<td></td>
</tr>
<tr>
<td>Age 55 or older</td>
<td>696,083</td>
<td>20.6%</td>
<td></td>
</tr>
</tbody>
</table>
Data Aggregation

Export Geography

Choose an export format:

- ShapeFile (Results, All Years)
- KML (Results, Current Year Only)
- CSV (Selection Area, Census Blocks in Selection Area)

Cancel  Okay
LEHD Wage Classification Data

Earning $1,250 or less per month
  - Low-wage workers

Earning $1,250 to $3,333 per month
  - Medium-wage workers

Earning more than $3,333 per month
  - High-wage workers

Earnings

<table>
<thead>
<tr>
<th>Earnings</th>
<th>2015 Count</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,250 per month or less</td>
<td>707,179</td>
<td>21.0%</td>
</tr>
<tr>
<td>$1,251 to $3,333 per month</td>
<td>1,088,050</td>
<td>32.3%</td>
</tr>
<tr>
<td>More than $3,333 per month</td>
<td>1,576,805</td>
<td>46.8%</td>
</tr>
</tbody>
</table>
LEHD Low-Wage Jobs: 2002-2015
LEHD: 2002-2015


Distance to Dallas CBD: 24 mi
Travel Time: Avg 45 Minutes [Peak HR, Using Toll Rd.]
Home Location of Workers

Where do workers live?

Dallas
DFW Airport
Plano
Frisco

Home Area Profile Analysis
Workers Home Locations

Worker Ethnicity

<table>
<thead>
<tr>
<th>Worker Ethnicity</th>
<th>2015 Count</th>
<th>Share</th>
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</thead>
<tbody>
<tr>
<td>Not Hispanic or Latino</td>
<td>2,551,209</td>
<td>80.2%</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>639,405</td>
<td>19.8%</td>
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</table>

Worker Educational Attainment

<table>
<thead>
<tr>
<th>Worker Educational Attainment</th>
<th>2015 Count</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than high school</td>
<td>385,349</td>
<td>11.9%</td>
</tr>
<tr>
<td>High school or equivalent no college</td>
<td>633,434</td>
<td>19.5%</td>
</tr>
<tr>
<td>Some college or Associate degree</td>
<td>797,550</td>
<td>24.7%</td>
</tr>
<tr>
<td>Bachelor’s degree or advanced degree</td>
<td>692,645</td>
<td>21.4%</td>
</tr>
</tbody>
</table>

Worker Sex

<table>
<thead>
<tr>
<th>Worker Sex</th>
<th>2015 Count</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1,651,548</td>
<td>51.1%</td>
</tr>
<tr>
<td>Female</td>
<td>1,579,066</td>
<td>48.9%</td>
</tr>
</tbody>
</table>

Worker Age

<table>
<thead>
<tr>
<th>Worker Age</th>
<th>2015 Count</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 25 or younger</td>
<td>724,636</td>
<td>23.3%</td>
</tr>
<tr>
<td>Age 30 to 54</td>
<td>1,842,662</td>
<td>57.5%</td>
</tr>
<tr>
<td>Age 50 or older</td>
<td>666,316</td>
<td>20.5%</td>
</tr>
</tbody>
</table>
LEHD HOME AREA PROFILE

Where Do Black Workers Live?
LEHD HOME AREA PROFILE

% Low-Wage Workers [Home Location]
Share of Jobs Occupied by White / Black Workers

[LEHD 2015]
EJSCREEN: Environmental Justice Screening and Mapping Tool
LEHD 2015

Work Area Profile & Home Area Profile

Relationship Map

Low-Wage Job Added (%) vs. Low-Wage Residents (%)

High % of low-wage job added

High % of low-wage workers home location

Dallas

Legend

Low Income Housing Tax Credit Properties (HUD LIHTC)

DFW: Low-Wage Jobs Growth

Relationship

% of low-wage job added

% of low-wage workers home location
Location Affordability

Housing and Transportation Costs as % of Household Income

Tools & Databases

HUD Low-Income Housing Tax Credit (LIHTC) Properties
- [www.lihtc.huduser.gov/](http://www.lihtc.huduser.gov/)
- [www.huduser.gov/portal/datasets/lihtc.html](http://www.huduser.gov/portal/datasets/lihtc.html)
- [https://placedatabase.policymap.com/](https://placedatabase.policymap.com/)

HUD Location Affordability Index
- [www.hudexchange.info/programs/location-affordability-index/](http://www.hudexchange.info/programs/location-affordability-index/)
- [https://placedatabase.policymap.com/](https://placedatabase.policymap.com/)

H+T Index from the Center for Neighborhood Technology (CNT)
- [www.cnt.org/tools/housing-and-transportation-affordability-index](http://www.cnt.org/tools/housing-and-transportation-affordability-index)
Location Affordability Index
H+T Index (CNT.org)
Subsidized Housing

Low-Income Housing Tax Credit (LIHTC) Properties

Distance to Dallas CBD:
24 mi
Travel Time:
Avg 45 Minutes
[Peak HR, Using Toll Rd.]

https://hub.arcgis.com/items/def91e5f79c74e60bf7189b78bb77505
Job Accessibility

- How close are low-wage workers to a transit stop?
- How far do they have to travel to get to the workplace?

Tools & Databases

The General Transit Feed Specification (GTFS)
- [https://transitfeeds.com/](https://transitfeeds.com/)

EPA Smart Location Database
- Access to Jobs and Workers Via Transit Tool
  - [www.epa.gov/smartgrowth/smart-location-mapping](http://www.epa.gov/smartgrowth/smart-location-mapping)
  - [https://epa.maps.arcgis.com](https://epa.maps.arcgis.com)
Job Accessibility with Transit

Distance to Dallas CBD: 24 mi
Travel Time: Avg 45 Minutes [Peak HR, Using Toll Rd.]

Transit Travel Time: Avg 1 h 50 Minutes
Data Integration

- Overlapping and Integrating all factors

https://arcg.is/0ynfXT

- Investigating other indices:
  - Low Poverty Index
  - Labor Market Engagement Index
  - Employment Access Index
  - School Proficiency Index

ArcGIS Online Web Application: https://arcg.is/0ynfXT
Conclusions

Transportation & logistics
  - EHD Home & Work Area Profile Analysis

Job Sprawl and Spatial Mismatch
  - EHD Home & Work Area Profile Analysis
  - Housing Affordability
  - Accessibility

Mapping Job Growth
  - Historical Trends

Subsidized Housing
  Job Decentralization
  Transportation Cost
  Housing Cost
  Affordability
Thank You

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References


Reports: