CUTR
CENTER for URBAN TRANSPORTATION RESEARCH

A Guidance in Logistics Investments through Logistics Activity Center (LAC) Site Location Criteria Development

Presenter:

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Outline

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1. Background and Introduction

- Freight mobility is an important element in fulfilling demand. It affects the state economy and is a driving force for maintaining/creating jobs and economic development

- 67.6 % – increase in the value of freight transported in the U.S. between 2004 and 2014 (USDOT, 2014)

Source: http://seclgurgaon.blogspot.com/2015/04/rise-of-freight-and-transport-services.html

2. Objectives

- Determination of an optimized location criteria for logistics activity center (LAC) development potential

- Identify and prioritize different locations based on their LAC development potential to help guide the appropriate investments for successful LAC development

3. Literature Review

Determining Success Factors for LAC development

- The development of LACs is on the rise **to address increasing costs by achieving higher logistics efficiencies**

- **Evaluation of Logistics Led Economic Development, Ozkul et al.(2015)**
  - Five major categories of success factors for LACs
    1. Strategic location
    2. Economic incentives for development
    3. Champion
    4. Government support
    5. Other factors
  - These factors were applied to evaluate LAC sites identified in the literature and interviews were held with a select-few mega LACs

4. Data

- The previous Ozkul et al. (2015) study suggests that strategic location is a major determinant of the success of an LAC investment

Buffer Distance Criteria Selection

Strategic location criteria - availability of or proximity to:

- Seaports (land access)
- Intermodal yards (land access)
- Cargo airports (land access)
- Florida's Strategic Intermodal System (SIS) Roads (Access Points/Interchanges)
- State and US roads (arterial truck routes)
- Rail tracks (direct access)

4. Data (cont'd)

- A list of **primary strategic location factors** that contribute to successful LAC development and site selection were determined and analyzed under four sub-sections:
    - **I. Buffer Distance Criteria**
    - **II. Buffer Weight Criteria**
    - **III. Utility Availability Criteria**
    - **IV. Land Cost Effects Criteria**

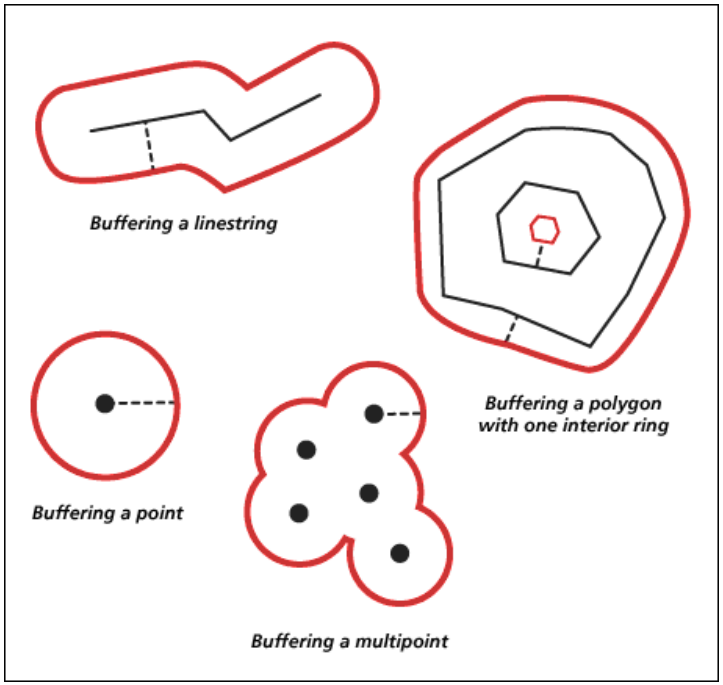
- Data were obtained using spatial analysis/ArcGIS for the FDOT D7 region

- Each of the facility types was assigned a specific buffer distance which, when input in the ArcGIS, resulted in maps with overlapping areas

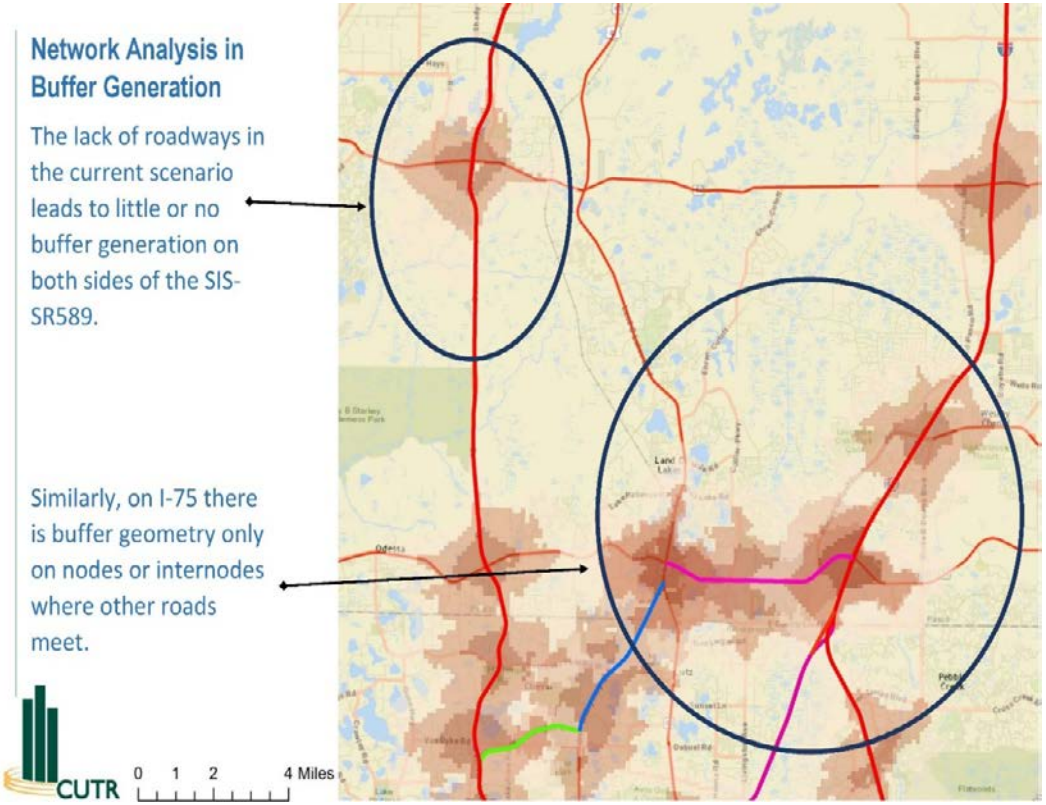
5. Theory and Calculations (cont'd)

Buffer Methods

1. **Simple (Linear Type)**
2. **Driving Distance (Network Availability)**



Source: http://desktop.arcgis.com/en/arcmap/10.3/manage-data/using-sql-with-gdbs/spatial-operation-functions-for-st-geometry.htm (July 20, 2016)

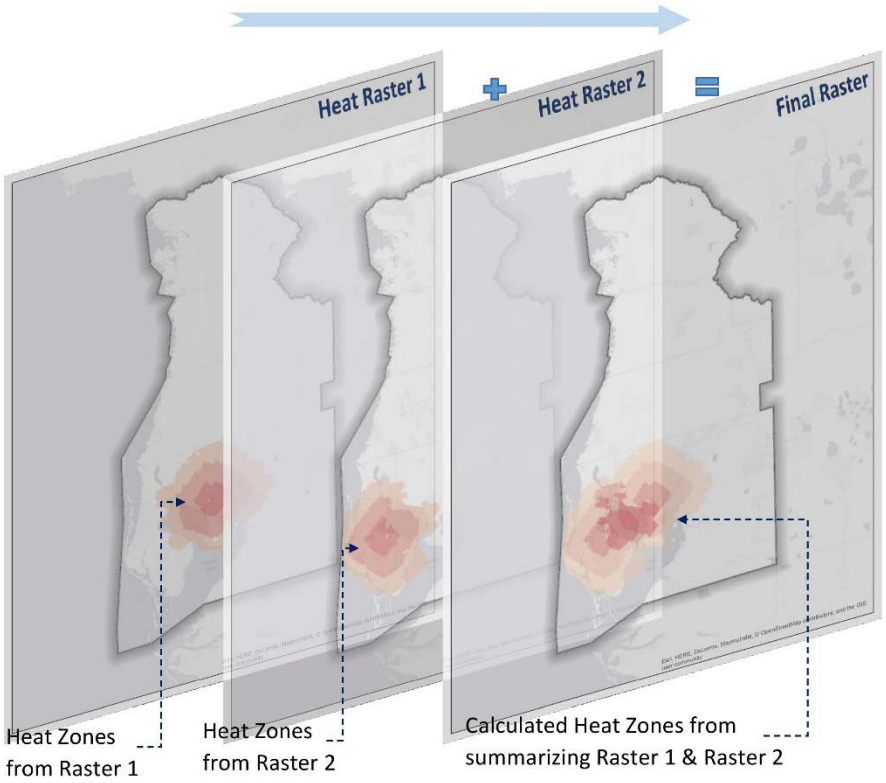


5. Theory and Calculations (cont'd)

Buffer Assimilation Process

These pixels contained the "heat" or measure of their proximity to each of the facilities mentioned previously

- Raster images were stacked on top of each other
- The resulting map accounted for all LAC development criteria, including the strategic location criteria discussed previously and the availability of utilities and land cost criteria discussed in the following sections



Raster Calculation

To determine the final Heat Pattern multiple Raster obtained from different facilities are assembled together. The resultant raster would have the influence of all the individual raster data and give a spatial reference of all nearby facilities.

5. Theory and Calculations (cont'd)

Buffer Weight Selection

- The maximum total net weight for a facility (the highest end of "High" LAC development potential) was fixed at 100
- The total influence of all facilities sum to a specific score for each location on the map, resulting in a measure of LAC development potential of that specific site

Table 1. Buffer Distances and Corresponding Weights for All Facility Types per LAC Development Potential

Facility Type	Buffer Type	Buffer Distance (mi)			Buffer Weight		
		High	Moderate	Low	High	Moderate	Low
Rail Track	Simple (Linear)	0.25	0.5	0.75	**7**	**5**	**2**
Rail Intermodal Yards	Driving Distance	5	10	15	**24**	**19**	**14**
SIS Roads (Access Points)	Driving Distance	1	2	3	**12**	**10**	**7**
State and US Roads (Truck Routes)	Simple (Linear)	1	2	3	**9**	**7**	**5**
Cargo Airports (Land Access)	Driving Distance	5	10	15	**24**	**19**	**14**
Seaports (Land Access)	Driving Distance	5	10	15	**24**	**19**	**14**

5. Theory and Calculations (cont'd)

Availability of Utilities

- To fully account for the LAC development potential of an area, the availability of utilities was determined to be a major element
- A penalty of negative five (-5) points out of 100 possible weight points was applied to sites that did not have utility access (water, sewer, or electricity)

Land Cost Consideration

- Land cost is a highly important aspect behind any successful LAC development initiative
- Each analysis pixel [0.01 square miles (approx. 6.4 acres)] was assigned an average cost
- Existing land price was evenly distributed and high-priced areas were penalized (Table 2)

Exclusion of Unavailable Areas

- Exclusion of areas that are not available for LAC development such as non-vacant lands with existing facilities, military zones, environmentally-protected lands

Table 2. Land Cost Weighting Criteria

Class	Cost Per SF	Weight
Low Cost	$ 0–8	5
Moderate Cost	$ 8–15	0
Moderate-to-High Cost	$ 15–50	-50
High Cost	$ 50+	-90

6. Results and Validation

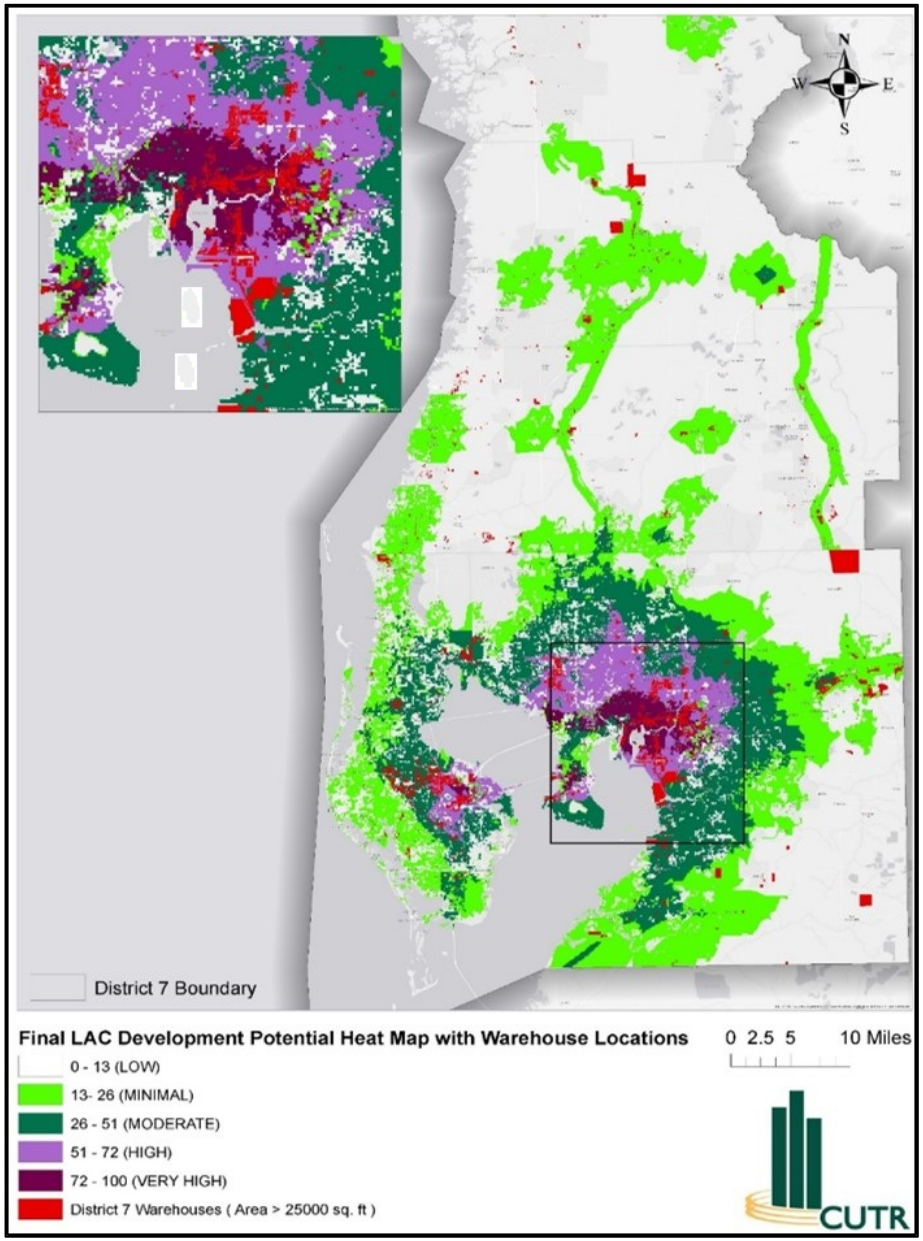
- The final LAC development potential types were classified into five major groups to capture all LAC development potential categories for all five FDOT D7 counties

Table 3. Final LAC Potential Categories and Corresponding Range of Total Weight Factors

Class	Range of Total Weight Factors
Very High	72-100
High	51-72
Moderate	26-51
Minimal	13-26
Low	0-13

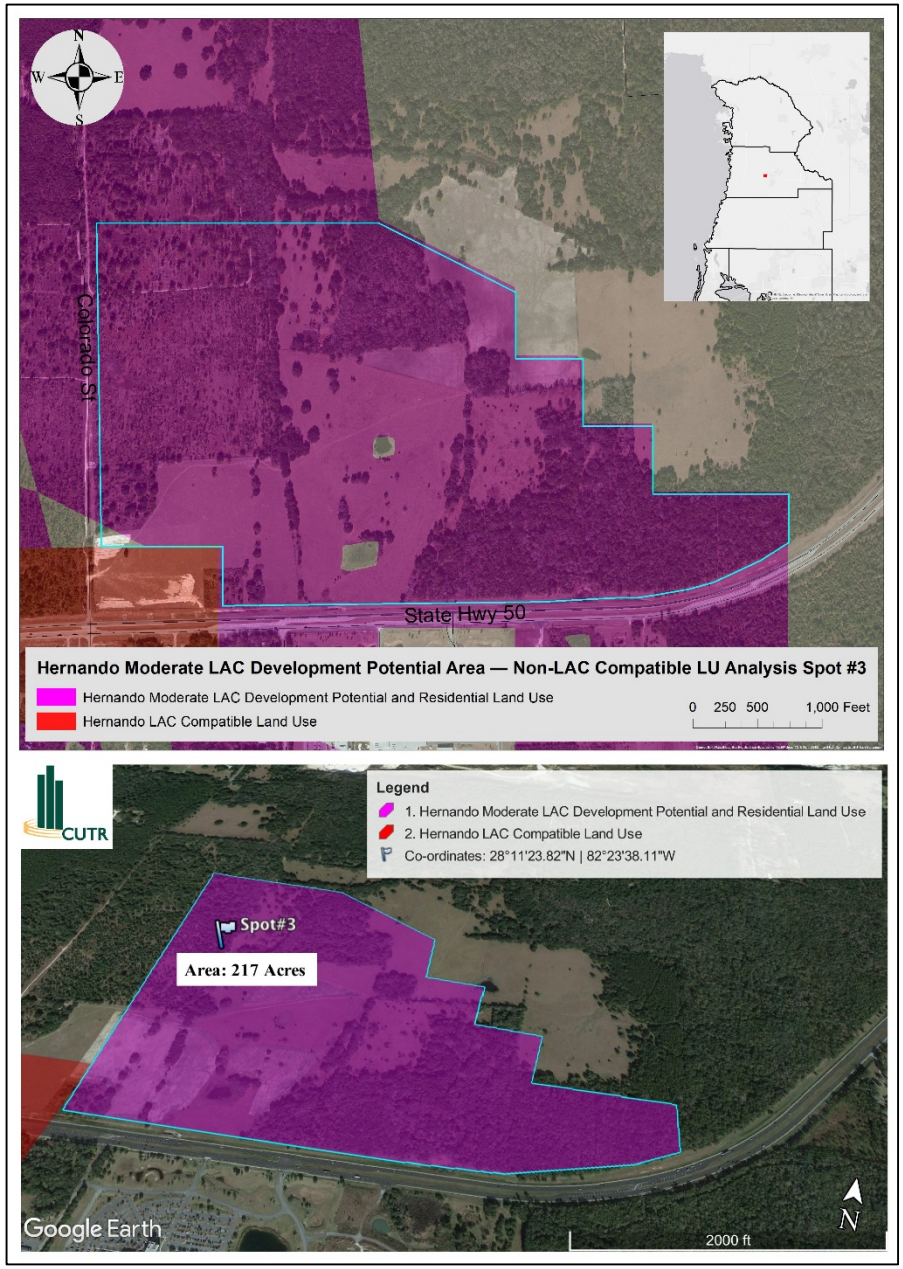
6. Results and Validation (cont'd)

- The initial "heat" maps obtained through assimilating ONLY the strategic location data were continuous (solid)
- With the introduction of utility availability, land cost factors, and removal of unavailable lands, the final LAC development potential heat map was found to be "patchy"
- Existing FDOT D7 warehouses layer (Renaissance Planning) was then laid over the final LAC development potential "heat" map
- Only warehouses with an area of greater than 25,000 sq. ft. were considered for referencing under the LAC criteria
- Most of the large warehouses were found to be clustered around the "very high" and "high" heat areas obtained through this research, thus highly validating the criteria developed



7. Final Site Maps

- The sample final site map depicts sites falling under the “heat criteria” and also “LAC compatible land zone”, hence providing a guidance on future LAC development
- The final site maps depict the following:
  1. LAC development potential “heat” classification
  2. Land use category
  3. Latitude and longitude for the exact location
  4. Nearby roadway intersection
  5. Neighboring LAC compatible lands (if available)
  6. Legend and scale for reference
  7. A Google Earth 3D representation
  8. Approximate area of the land (in acres)
  9. An overall map showing regional location



8. Conclusion

- The methods and findings of this research in determining the LAC development potential of possible sites can be used towards investment allocation and maximization of the return on investment (ROI)

- **Areas with "Very High" potential for LAC development**
  - Located within the influence area of all three major freight generators (seaport, airport with cargo access, and intermodal yard) and abutting major roadways
  - Observed prospective investment locations (West Pinellas County and South/Southeast Hillsborough County)

- **Areas with "High" potential for LAC development**
  - Located within the influence area of at least two out of the three major freight generators and abutting major roadways
  - Observed prospective investment locations (outer layers of West Pinellas County and South/Southeast Hillsborough County)

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