A Guidance in Logistics and Safety Investments through Logistics Activity Center (LAC) Development Criteria Analysis

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Introduction

Efficient freight movement affects a geographic area's economy, public safety and overall quality of life. Previous studies found that freight and logistics investments in Logistics Activity Centers (LACs) fuel economic development and keeping this logistics activity in a specified region increases public awareness and safety. To help guide the appropriate investments for successful LAC development, this research focused on the determination of optimized location criteria for LAC development potential.

Background

Evaluation of Logistics Led Economic Development, Ozkul et al.(2015)

Determined five major categories of LAC success factors:

- *Strategic location*
- *Economic incentives for development*
- *Champion*
- *Government support*
- *Other factors*

These factors were then applied to evaluate LAC sites identified in the literature.

Munoz and Rivera (2010) employed cluster analysis to propose a structure of seven critical factors needed for developing logistics hubs.

Key insights (Figure 1)

- "Strategic location" as the foundation to every successful logistics hub
- Pillars – required processes
- Capstone – reinforcement element that guarantees successful development

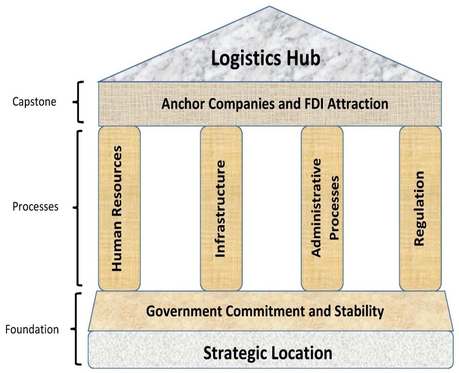

Figure 1. Recreated from Munoz and Rivera (2010)

Objectives

- Identify and prioritize geographic locations based on their LAC development potential
- Enable development firms, site selectors, and real estate investors in shaping their freight planning, freight-related investments and safety initiatives to yield the highest ROI for all stakeholders

Methodology

A list of primary strategic location factors that contribute to successful LAC development and site selection were determined and analyzed under four sub-sections:

1. Buffer distance criteria selection
2. Buffer weight selection
3. Availability of utilities
4. Land cost consideration

Buffer Distance Criteria Selection

Strategic location criteria availability and/or proximity of:

- 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 (major truck routes)
- Rail tracks

Data were obtained using spatial analysis/GIS for the FDOT D7 region.

Each of the facility types was assigned a specific buffer distance which, when entered in the GIS tool, resulted in raster maps with overlapping areas (Figures 2 & 3).

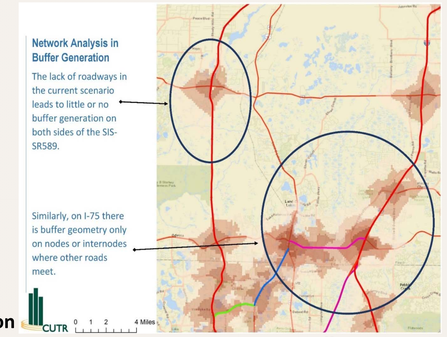

Figure 2. Driving Distance Buffer

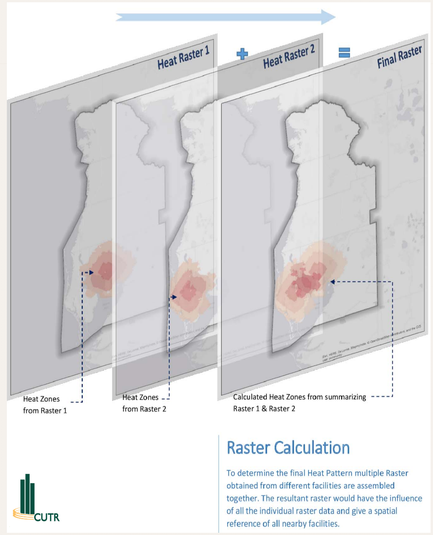

Figure 3. Raster Calculation

Extended Analysis of Potential LAC Development Zones

Certain zones encompassing multiple LAC development parcels, which are in close vicinity of each other are grouped together. This may bear a greater potential for future LAC development as a cluster. These clusters of LAC spots are the optimized locations for LAC development. These clusters are grouped together, and a series of 3D Google Earth shots are prepared by the research team to direct focus on the public safety, economy and overall quality of life.

Figure 4. Pasco County Corridor Analysis

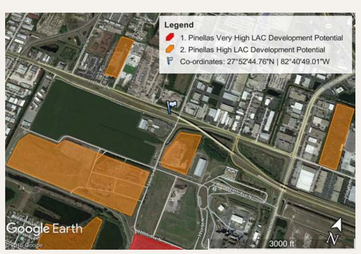

Figure 5. Pinellas County Corridor Analysis

Results / Validation

- Once the location criteria for LAC development potential were finalized to include strategic location, utility availability, and land cost, an LAC development potential heat map was generated to analyze the FDOT D7 area in terms of the potential of each heat category
- The finished LAC Heat map was compared against existing 6,500 warehouses with a gross area of greater than 25,000 sq. ft. and this distribution was found to be clustered around the heat zones as expected
- The final LAC development potential types were finally classified into five major groups as mentioned below.

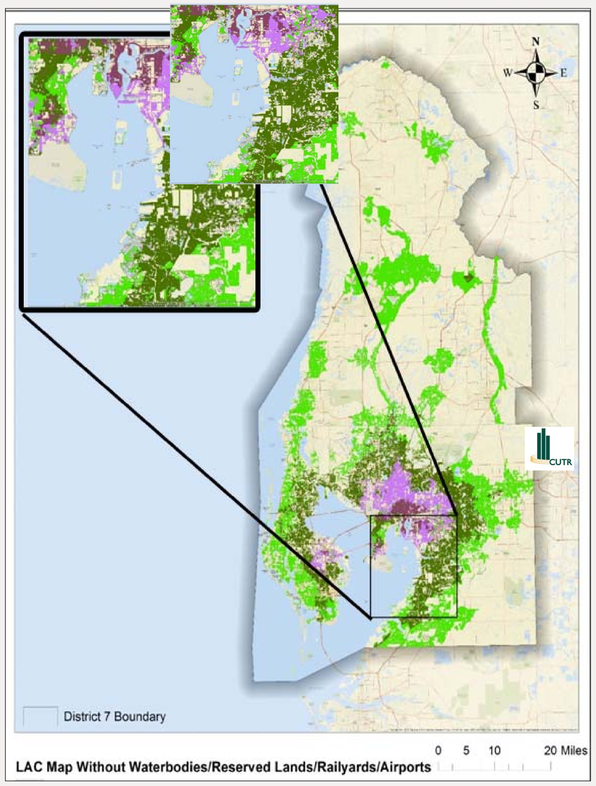

Figure 7. Final LAC Development Potential Map Depicting Logistic Activity Center Development Potential As Heat Zones Over Greater Tampa Bay Region

Theory / Analysis

Buffer Weight Selection

Table 1. LAC Development Potential Weight Distribution

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

Availability of Utilities

- To fully account for the LAC development potential of an area, the availability of utilities was also 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 also a very important aspect for successful LAC development (Table 2)
- Any location that was indicated as having high LAC potential, but having a high land cost, was normalized using a penalty of -90 (high cost) and -50 (moderate-to-high cost) out of 100 possible weight points, making them less desirable for LAC development
- The addition of +5 to the lower land cost areas was designed to boost their heat designation and therefore making them more desirable for LAC development
- The pixels used for analysis in Figure 4 correspond to a square that is 0.1 mile (528 ft.) on each side. This correlates to an area of 0.01 square miles (approx. 6.4 acres)

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

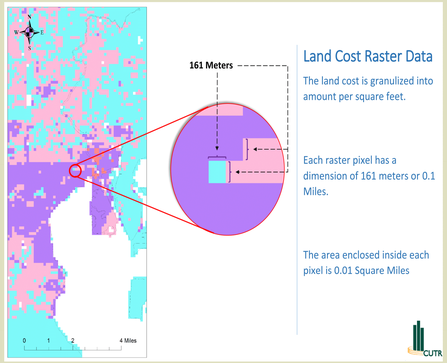

Figure 6. Land Cost Raster Data

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